Essays on leveraged buyouts

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Yaping Mao

To my mama and Anneke

Essays on Leveraged Buyouts

PROEFSCHRIFT

Proefschrift ter verkrijging van de graad van doctor aan Tilburg University, op gezag van de rector magnificus, prof. dr. Ph. Eijlander, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de Ruth First zaal van de Universiteit op dinsdag 26 november 2013 om 10.15 uur door

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Table of contents

Introduction

This Ph.D. dissertation consists of three chapters on private equity (PE) investments. The first chapter studies the earnings manipulation preceding the public-to-private leveraged buyouts (LBOs). The second and third chapters focus on the private LBOs. Chapter 2 analyzes what determines a private LBO to be financed by a private equity firm rather than purely by a bank. It also provides evidence of the outcomes of a PE sponsored deal relative to a bank financed one. Chapter 3 investigates the role of private equity firms in the build-up of professional teams in private LBOs, in terms of board restructuring and CEO appointment activities. Chapter 1 is a joint work with Luc Renneboog, while Chapter 2 is co-authored with Marco Da Rin and María Fabiana Penas. The summary of the chapters are as follows.

1. Chapter 1

1.1 Motivation

Leveraged buyouts have been an important means of corporate restructuring since the early 1980s. Public-to-private LBOs is a large and eye-catching type of private equity investments. These deals account for 6.7% of all international PE transactions but represent 28.2% of the combined values of companies acquired from the 1990-2007 period (Strömberg, 2008). Researchers devote great efforts to understand the value creation of public-to-private LBOs and to identify the potential value drivers after the transactions. However, the activities before the transactions may well influence the buyout price and subsequent gains in the first place and thus call for in-depth research. The consequence of the activities before LBOs is far reaching: if earnings distortion is reflected in the buyout stock price, the stock price decline leads to a wealth loss for shareholders and is irreversible when the company goes private after the buyout. The UK's Financial Services Authority (FSA, 2006) expresses concerns about this market abuse and suggests more intensive supervision of LBOs. Therefore, in the first chapter, we investigate the earnings manipulation preceding public-to-private LBOs.

1.2 Research Questions

Whereas the accounting manipulation prior to US management buyouts (MBOs) has occasionally been documented in the literature over the past 20 years, there is no explicit research outside the US. Moreover, the literature usually studies the first wave of LBOs (in

the 1980s). However, the second wave of LBOs coincides with the tightened corporate governance regulation (Guo et al., 2011) and enhanced reporting integrity (Botsari and Meeks, 2008), which provides a particular interesting setting to test earnings manipulation behavior. We therefore concentrate on researching whether accounting manipulation has occurred/still occurs in the second most important buyout market, namely that of the UK and focus on the period since the start of the second LBO wave: 1997-onwards. Next, we investigate two types of incentives underlying accounting manipulation in an LBO/MBO[1] context. On one hand, managers may opt to present lower earnings if they are likely to participate in a prospective buyout transaction and will subsequently stay with the company. Negative earnings manipulation is induced by the *management engagement* incentive. On the other hand, managers' incentive to misrepresent the earnings may be related to the financing of the future transaction. Public-to-private LBOs are highly leveraged. Low earnings numbers can reduce the amount of debt that a firm can bear at the relevering stage. Thus, managers can manipulate earnings upwards in order to facilitate the buyout transaction – this is the *external financing* incentive. Finally, we assess the impact of the revised UK Corporate Governance Code of 2003 on curbing the earnings manipulation. The new regulation aims to increase the board accountability and improve the reporting quality. Put together, we examine: (1) the earnings manipulation preceding the LBOs; (2) The competing incentives for the earnings manipulation; (3) The effectiveness of accounting regulation on curbing earnings manipulation.

1.3 Findings

We find that using our advanced industry-adjusted buyout-specific methods, downward earnings management, both in terms of accrual and real earnings management has been widely used in the UK since the start of the second buyout wave. The abnormal accrual figures are significantly more negative in MBOs than in LBOs. In contrast, in non-buyout firms, positive earnings management frequently occurs because it affects managers' bonuses and the likelihood of meeting or beating analysts' expectations which may trigger a positive market reaction. Applying the two-staged instrumental variable methods, we document that the (ex ante) perceived likelihood that an MBO will be undertaken has a strong significant effect on negative earnings management, while the external borrowing capacity of the buyout

[1] We distinguish here between MBOs whereby the pre-transaction management remains (financially) involved in the company subsequent to the transaction, and LBOs which we define as transactions without subsequent involvement of the incumbent management.

company is not determined by standard capital structure factors, such as earnings numbers. We also show the revised Corporate Governance Code of 2003 has had a significant impact on both accrual and real earnings manipulation. Accrual management has indeed declined since 2003. In contrast, the other manipulation techniques (regarding production costs and asset revaluations) are more frequently used since the tightening of the corporate governance regulation, which may be induced by the fact that these manipulation methods are more difficult to detect. However, in MBOs, both accrual and real earnings manipulations are reduced after 2003. Overall, our findings imply that more stringent accounting rules have been effective to alleviate dishonest earnings management in MBOs.

2. Chapter 2

2.1 Motivation

In addition to large public-to-private LBOs, a primary type of private equity investments is hitherto largely unexplored, that is, private-to-private LBOs (private LBOs). Private buyouts are economically relevant transactions. According to Strömberg (2008), 10018 private LBOs comprise 46.8% of all worldwide buyout transactions undertaken from 1970 to 2007; this compares to 1,399 public-to-private LBOs, which accounted for 6.7% of the total buyouts deals. In terms of deal value, public-to-private LBOs, which are larger transactions, amount to USD 1.1tn, or 28.2% of the total transactions volume; still, private LBOs amount to USD 0.85tn which represents 21.8% of total deal value. Buyouts of private companies are important, as private companies are the backbone of the economy[2]. For instance, given the significant reduction in public sector employment during the current financial crisis, private sector remains the "engine room" of the economic growth (ECI Survey[3] 2010 and 2011). More importantly, the economic rationale of private LBOs may be quite distinct from that of public-to-private LBOs, as private companies have concentrated ownership (Bodnaruk et al., 2008) and typically have owner-managers; therefore these companies are less exposed to agency problems than public ones. Hence, in this paper, we focus on the role of private equity investors in private LBOs.

2.2 Research Questions

[2] Private companies represent 97.5% of all incorporated entities in the United Kingdom and more than two-thirds of corporate assets are owned by private companies (Brav, 2009).
[3] ECI Growth Survey (2010 and 2011) can be downloaded from http://www.ecipartners.com/.

The literature on private LBOs is very scant, as data on private companies are largely unavailable. Two papers are closely related to ours. Both Boucly et al. (2011) and Acharya et al. (2013) study the value creation after private LBOs. Neither paper looks into the determinants of private buyouts. We first ask what types of private companies are more likely to be targeted by a PE firm relative to a bank. We consider four motivations for this selection, at both industry-level and firm-level. Our research design controls for the determinants of the choice to undertake a buyout in the first place, and focus on whether a specialized intermediary is chosen conditional on buyouts. In so doing, we manage to study how private equity backed buyouts create value beyond the lifting of financial restrictions and improving monitoring that is typical of bank-financed private buyouts, and further explore the economic rationale underlying the PE sponsorship. Next, we turn to analyze company evolution after the private LBOs, by looking at the growth, investments, leverage and profitability dimensions. However, to the extent that the choice of being backed by a PE firm is not random, we need to be cautious in interpreting the results, and cannot interpret them as in a causal way. In summary, we investigate what determines private LBOs to be backed by PE firms and how these deals fare in the aftermath.

2.3 Findings

Adopting our empirical strategy of comparing PE-sponsored private LBOs to bank-financed ones, we document that both company and industry characteristics contribute to explaining why some deals are PE-backed. PE investors back private companies that are more profitable and faster growing. Industry competition is also crucial, companies that operate in more concentrated and more dynamic industries are more likely to be backed by PE investors. However, we do not find factors like access to credit or the resolution of agency conflicts to be relevant for PE sponsorship of private LBOs. In other words, it implies that they are not relevant for the choice of financial intermediaries conditional on buyouts. We verify that PE has a strong differential effect, compared to banks, on post-deal growth and corporate policy. PE-backed companies grow faster, invest more, take on more debt, and are less profitable than bank-financed ones.

3. Chapter 3

3.1 Motivation

We extend the previous chapter by studying the specific role of PE firms in private LBOs. PE firms are specialized financial intermediaries whose role goes beyond that of the traditional financial institutions such as banks that provide capital and monitoring. In public-to-private LBOs, PE firms mostly exercise a governance role to mitigate agency problems. Private LBOs are very different from public-to-private deals in the sense that the agency problem is not so severe, given that ownership in private companies is highly concentrated, as documented in Chapter 2. Zingales (2000) suggest that human capital is the key to the development of companies. Therefore, we focus on the human capital role of PEs in private LBOs, and examine whether PEs are actively involved in the board and provide support and expertise to their portfolio companies. We continue to use our bank-financed private LBOs as a control sample. This comparison helps to determine whether the PEs are more active than banks which are perceived to be passive investors (Winton and Yerramilli, 2008).

3.2 Research Questions

To pin down the human capital role of PE firms in private LBOs, we first study the impact of PEs on professional team building, specifically on firing decisions of old board members and on recruiting new ones. We further analyze whether the board turnover activities are influenced by the equity holdings of the PE firms. Second, we examine the changes in board size. When the PE role of governance dominates, the board size is expected to decline (Cornelli and Karakas, 2013). In contrast, when advice is needed for growing companies, the board size is predicted to enlarge (Coles et al., 2008). Third, we look at whether PEs also influence the leadership of the buyout targets, in terms of outside CEO appointment. Kaplan et al. (2012) document that outside CEOs possess superior managerial skills compared to inside CEOs. However, the hiring of an outside CEO requires extra searching effort and thus appointing an outside CEO can then be perceived as the particular value and expertise that PEs bring to the private LBOs. In short, we investigate the human capital role of PE investors in: (1) the building up the professional teams; (2) the change in board size; (3) the hiring of an outside CEO.

3.3 Findings

In line with our expectations, we find that PE firms are active in professional team building. Relative to banks, private LBOs financed by PE firms are more likely to dismiss incumbent board members and recruit new ones. We also find that the larger is the stake held by PE firms, the more involved they are in relation to board turnover. In addition, we show that

PE firms are more active in hiring rather than replacing board members. We also document that after private LBOs, there is a reduction in board size. However, PE-sponsored buyouts increase the board size, consistent with the notion that PEs play an important role in advising their companies in their expansion phase. Finally, our results confirm the important role of PE firms in initiating leadership changes in private buyouts. We find that in comparison with banks, PE sponsors are more likely to hire an external CEO. The finding can be interpreted as evidence that outside CEOs are more likely to work with PE firms to implement policy changes in the buyout companies. We conclude that private equity firms are actively involved in their portfolio companies and provide governance and support that go beyond the supply of funds or monitoring activities typical of more traditional financial intermediaries.

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Chapter 1

Do Managers Manipulate Earnings Prior to Management Buyouts?

Abstract

To address the question as to whether managers manipulate accounting numbers downwards prior to management buyouts (MBOs), we implement an industry-adjusted buyout-specific approach and receive an affirmative answer. In UK buyout companies, negative earnings manipulation (understating the earnings prior to the deal) often occurs, both by means of accrual management and real earnings management. We demonstrate that MBOs are significantly more frequently subject to negative manipulation than leveraged buyouts (LBOs). In non-buyout firms, positive earnings management frequently occurs because it affects managers' bonuses and the likelihood of meeting or beating analysts' expectations which may trigger a positive market reaction. By means of an instrumental variables approach, we examine competing incentives affecting the degree and size of earnings manipulation. Our evidence implies that the (ex ante) perceived likelihood that an MBO will be undertaken has a strong significant effect on negative earnings management, while the external borrowing capacity of the buyout company is not determined by standard capital structure factors, such as earnings numbers. The implementation of the revised UK Corporate Governance Code of 2003 has somewhat reduced the degree of both accrual earnings and real management in MBOs, but since then other manipulation techniques (related to production costs and asset revaluations) are more frequently used, which may be induced by the fact that these manipulation methods are more difficult to detect.

1. Introduction

Prior to management buyouts (MBOs), managers have an incentive to deflate the reported earnings numbers by accounting manipulation in the hope of lowering the subsequent stock price. If they succeed, they will be able to acquire (a large part of) the company on the cheap. It is important to note that accounting manipulation in a buyout transaction may have severe consequences for the shareholders who sell out in the transaction: if the earnings distortion is reflected in the stock price, the stock price decline cannot be undone and the wealth loss of shareholders is irreversible if the company goes private subsequent to the buyout. Mispriced stock and false financial statements are still issues frequently mentioned when MBO transactions are evaluated. The UK's Financial Services Authority (FSA, 2006) ranks market abuse as one of the highest risks and suggests more intensive supervision of leveraged buyouts (LBOs). The concerns about mispriced buyouts are therefore a motive to test empirically whether earnings numbers are manipulated preceding buyout transactions.

Whereas the manipulation of financial statements prior to US MBOs has occasionally been detected in the academic literature over the past 20 years, we wonder whether accounting

manipulation has occurred/still occurs in the second most important buyout market, namely that of the UK which is subject to different regulation and enforcement. We focus on the period since the start of the second LBO wave: 1997-onwards, which also coincides with the tightened corporate governance regulation (Guo et al., 2011) and enhanced reporting integrity (Botsari and Meeks, 2008). We investigate two types of incentives for accounting manipulation in an LBO/MBO context. On one hand, managers may opt to present lower earnings if they are likely to participate in a prospective buyout transaction and will subsequently stay with the company. Negative earnings manipulation or earnings understatement is induced by the *management engagement* incentives. On the other hand, managers' incentive to misrepresent the earnings may be related to the financing of the future transaction. A typical LBO is traditionally financed with 60 to 90 percent debt (Kaplan and Strömberg, 2009) – although this ratio has decreased to 50-60 percent since the recent financial crises. Low earnings (cash flow) numbers would reduce the amount of debt that a firm could bear at the relevering stage. Thus, managers who prepare a corporate sale by means of an LBO could manipulate earnings upwards in order to facilitate the buyout transaction – this is the *external financing* incentive. We distinguish here between MBOs whereby the pre-transaction management remains (financially) involved in the company subsequent to the transaction, and LBOs which we define as transactions without subsequent involvement of the incumbent management.

We not only concentrate on *whether and why* manipulation occurs but also on *how* earnings manipulation can occur by considering accrual management and real earnings management preceding the buyouts. Whereas accrual-based earnings management activities have no cash flow consequences, real earnings management refers to managerial activities which deviate from normal business practices and affect cash flows. We advance an industry-adjusted buyout-specific approach to capture the abnormal accounting numbers which proxy for accounting manipulation. In this context, we also study asset revaluations and transfers across reserve accounts on the balance sheet as a means of external financing manipulation.

The contributions to the literature are the following: First, there is little evidence on earnings manipulation outside the US buyout market, which raises the question as to whether dishonest accounting management is a phenomenon that other markets also suffer from? Moreover, most studies have examined a sample belonging to the first MBO wave of the

1980s. Since then, the corporate governance regulation has been tightened (Guo et al, 2011), and accounting standards became stricter in terms of transparency. For instance, in 2003, the revised Combined Code on Corporate Governance (currently called: the UK Corporate Governance Code) was implemented to improve financial reporting quality which raises the question whether or not accounting management is still that pronounced? Second, earnings manipulation comprising accrual management and real earnings management are analyzed in the context of buyout transactions, but the management may also resort to (tangible) asset manipulation (asset revaluations and transfers between reserve accounts). We thus investigate multiple manipulation techniques. Third, while raw abnormal accruals are usually calculated in the earnings management literature, they still comprise accruals influenced by specific corporate events and are different across different industries. Therefore, we adjust the raw abnormal accruals for the mean abnormal accruals of non-buyout firms of the same size-group, industry and ex ante performance. In addition to the traditional approach of contrasting buyout firms with a control group of non-buyout peers matched by firm characteristics, we contrast MBOs to LBOs as both types of buyouts induce different incentives for earnings manipulation. We hence compare the adjusted abnormal accounting figures of MBOs and LBOs. In so doing, we provide a test of accounting manipulation directly attributable to manager engagement incentives around the buyout event. Fourth, we analyze the underlying incentives for accounting manipulation and address the endogeneity issue of using the (ex-post) buyout type as a proxy for management engagement incentives by means of a two-staged IV approach. In the first stage, we model the decision to undertake an MBO or LBO using firm characteristics in the year proceeding the accounting manipulation year. In the second stage, we use the predicted MBO as a proxy for the management engagement incentive. We show that the causality is more likely to flow from the management engagement decision to the accounting manipulation decision.

We report the following findings: First, downward earnings management, both in terms of accrual and real earnings management, has been widely used in the UK since the start of the second buyout wave. Our industry-adjusted approach shows that the abnormal accrual figures are significantly more negative than those of non-buyout firms of the same industry and with similar size and ex ante performance. For buyout companies, the accruals decline in the manipulation year (the year prior to the deal announcement) whereas non-buyout companies are generally subject to positive accrual management as positive manipulation can affect

managers' bonuses and the likelihood of meeting or beating analysts' expectations which may trigger a positive market reaction. Second, in MBOs, there is evidence of more real earnings manipulation (through production costs and sales revenues) than in LBOs. The external financing incentive – upward earnings manipulation increases the relevering potential in a buyout transaction – is not supported by our analysis. This may be explained by the fact that during the second LBO wave it was easier to attract external funds, considering the growth in the high yield bond market (by more than 600% since 1997). Credit market conditions rather than company characteristics may determine the financing capacity. Third, besides income statement manipulation, we show that managers are more likely to revaluate assets upwards, the magnitude and frequency is small. The evidence on asset reserves revaluation is consistent with insignificance of the external financing incentive. Fourth, the revised Corporate Governance Code of 2003 has had a significant impact on both accrual and real earnings manipulation. Accrual management did indeed decline since 2003. In contrast, the other manipulation techniques (regarding production costs and asset revaluations) are more frequently used since the tightening of the corporate governance regulation, which may be induced by the fact that these manipulation methods are more difficult to detect. This finding is consistent with some recent US evidence: after the adoption of SOX, companies shifted from accrual management to real earnings management (Cohen et al., 2008). However, in MBOs, both accrual and real earnings manipulations are reduced after 2003. Overall, our findings imply that more stringent accounting rules have been effective to curb dishonest earnings management in management buyout transactions.

The paper is organized as follows. In the next section, we review the literature and develop the hypotheses. Section 3 describes how accounting management is measured and explains the empirical setup. Section 4 reports the sample selection criteria and discusses the descriptive statistics. The empirical results and robustness analyses are set out in Section 5. Section 6 concludes.

2. Literature overview and hypotheses

The US literature on accounting manipulation states that downward earnings management prior to MBOs is expected. In addition to income statement manipulation, we also examine balance sheet manipulation, more specifically: asset reserves revaluation (reflected by revaluations of tangible assets, the recording of increments (or decrements) in the equity

account, and changes to the debt-to-equity ratio) preceding the buyouts. The reason for this dual approach is that, as Dechow et al. (2010) suggest, managers can make a variety of accounting choices which are inspired by different (misrepresentation) objectives.

2.1. Accounting manipulation

2.1.1 Earnings manipulation

In the context of the surging MBO activity of the 1980s in the US, virtually every buyout proposal was contested by shareholders claiming that they were cheated (Longstreth, 1984). Even through recommendations by investment banks and approval by independent directors were sought to evaluate the fairness of buyout transactions, doubts about accounting manipulation remained. DeAngelo (1986) did not detect accrual manipulation preceding US MBOs, but Perry and Williams (1994) who worked with a larger sample and utilized a regression-based model to capture discretionary accruals more accurately, did document downward accrual management. Wu (1997) showed that on average, earnings manipulation prior to MBOs decreased the acquisition price by 18.6%. While managers may have good personal reasons to manipulate earnings downwards, they also have incentives to manipulate earnings upwards. Fisher and Louis (2008) stated that managers overstated their earnings to get favorable debt contract terms at the buyout, but for US MBOs, downward accrual management dominated. Ang et al. (2010) confirm that managers tend to manipulate earnings downwards if they continue to have a strong equity tie with the targets after the buyouts.

Managers have stronger incentives to understate the earnings numbers in MBOs relative to LBOs. We hereby define an MBO as a leveraged buyout transaction whereby at least one of the pre-buyout managers financially participates in the transaction and stays in the company subsequent to the buyout. According to our LBO definition, the incumbent management (prior to the LBO) will no longer be involved with the company subsequent to the transaction.

From an ownership perspective, managers are (co-)acquirers of MBO targets such that earnings manipulation resulting in a lower purchase price leads to self-dealing. In order to win the support of the management, financial sponsors in pursuit of target companies usually send a “love letter” which comprises an invitation to the current management team for further discussion and the intention to employ them after sealing the deal (Das and Chon, 2011). So, managers intending to stay in the firm have incentives to facilitate the transaction (although

the management's personal benefits in MBOs will largely exceed those in LBOs). Frequently, a ratchet is offered to the management which increases their post-transaction ownership stake in order to motivate them to achieve strong periodic performance and good exit returns[4] (Renneboog et al., 2007; Yates and Hinchliffe, 2010). Based on the above arguments, we postulate the *managerial engagement hypothesis*: *Prior to MBOs, earnings are manipulated downwards by both accrual management and real earnings management. Moreover, earnings are manipulated downwards to a larger extent in MBOs than in LBOs (H1).*

The implicit assumption underlying this hypothesis is that market participants cannot differentiate between earnings arising from business activities and manipulated earnings. In general, Bradshaw et al. (2001) find that even sophisticated investors, such as auditors and financial analysts, fail to detect accrual anomaly. Likewise, Bhojraj and Swaminathan (2007) show that bond investors do not correctly price accruals. Hence, the possibility of detecting manipulation seems rather low. Moreover, if manipulation is found out, managers could more easily justify downward manipulation than upward manipulation by referring to the principle of accounting conservatism.

Buyout transactions largely rely on external financing, a combination of senior loans, subordinated loans, and high-yield bonds. Ample evidence points out that the debt financier is prone to use earnings numbers to predict future cash flows and make credit decisions (Palepu et al., 2000). In a buyout setting, Fischer and Louis (2008) find that managers who need large external funds to finance an MBO are more likely to report less negative abnormal accruals, although this effect is tempered when fixed assets serve as collateral. Hence, the *external financing incentive* can be formulated as: *Earnings management is negatively related to the amount of external financing needed in a buyout. The relation is mitigated when the buyout company has more fixed assets that can serve as collateral (H2)*.

Alternatively, Axelson et al. (2013) contend that managers issue more debts when the credit market is overvalued. Therefore, a high bond market spread, as a proxy for credit market conditions, is a better predictor of buyout leverage than the earnings numbers. Shivdasani and Wang (2011) confirm that the boom in buyout transactions from 2004 to 2007 was fueled by

[4] A ratchet is an incentive mechanism which either offers managers a modest equity stake if managers meet ex-ante specified performance targets after buyouts (Renneboog et al., 2007) and/or entitles managers to receive a higher proportion of the exit proceeds if an exit is achieved beyond a particular 'hurdle' return rate for investors (Yates and Hinchliffe, 2010).

the fast growth in collateralized debt obligations (CDOs).

2.1.2. Asset revaluation manipulation

Whereas the literature on accounting manipulation prior to MBOs traditionally concentrates on earnings management (income statement manipulation) because earnings reflect current performance and are used in valuation exercises, balance sheet manipulation through 'asset revaluation' may also occur. This can also enable a target company to attract more debt to finance the deal. While earnings management is used to influence the stock price, asset revaluation manipulation is mainly used to affect the level of external borrowing.

Asset revaluation may be used more often in the UK than in the US: since the implementation of FRS3 in 1993, companies are encouraged to revalue fixed assets[5] on the ground that they provide useful and value relevant information[6]. The difference between an asset's old carrying value and its revaluation is credited to a revaluation reserve account on the balance sheet. The depreciation charges are subsequently calculated based on the revalued assets. Moreover, the gains or losses on the sale of previously revaluated assets are calculated referring to the new revaluation value instead of historical cost. Hence, the new asset revaluation practice has the following implications: (i) If assets are upwards (downwards) revalued, it increases (decreases) the equity amount via the revaluation reserve account on the balance sheet and thus lowers (boosts) the debt-to-equity ratio; (ii) If assets are revalued upwards, there is no contemporaneous effect on the income statement, but it will lower gains from a future asset disposal as the inflated carrying value will serve as the benchmark value. Meanwhile, the upward revaluation increases the future depreciation charges. If assets are revalued downwards, the net revaluation decrement is expensed on the current income statement.

To sum up, revaluations affect the current debt-to-equity ratio on the balance sheet, the future depreciation on the income statement, and the future gains from asset sales on the income statement. Revaluations are discretionary in nature, because managers can decide whether,

[5] Intangible asset revaluation is also permitted, but UK companies hardly use it (Aboody et al., 1999).

[6] Since the EU's adoption of IFRS in 2005, under IAS 16, companies can choose between: (i) the historical cost model; (2) the revaluation model. The Securities and Exchange Commission (SEC) has proposed that all US firms are required to issue financial statements in accordance with IFRS by 2014. Under IFRS, firms are allowed to choose either the cost model or the revaluation model to measure the value of fixed assets (SEC *for Immediate Release 2008-184).*

when, and what amounts of assets are revalued in financial statements (Lin and Peasnell, 2000).

At first glance, in a highly leveraged buyout, managers have an incentive to revalue assets upwards in order to be able to show a lower leverage ratio which enables them to attract the required amount of debt financing at favorable borrowing terms. Easton et al.'s (1993) survey shows that a key motivation to revalue assets is indeed such debt contract considerations. However, these current gains from upward assets revaluation induce a cost, namely the reduction of a buyout target's future gains. First, the accumulated assets revaluation reserves exhaust companies' possibilities to further use this manipulation tool subsequent to the buyout as the amount of upward revaluation is not unlimited. Second, upward manipulation increases depreciation and decreases net income in the near future. Moreover, as Wright et al. (2001) report, buyout targets often restructure by divesting non-core businesses to remove downside inefficiency. The inflated assets will lower the gains from future asset sales, which will also exert a negative impact on earnings. The resulting lower earnings will directly influence managers' bonuses and ratchets. It is also noteworthy that upward revaluation is also costly, as valuation fees are paid to independent valuators to certify the revaluation. Therefore, a manager has to weigh the costs of future gains against the current benefits. However, in LBOs (as we define them), managers will not be involved subsequent to the buyout and will hence not bear the future cost of upward revaluation. Therefore, we expect that: *assets are revalued upwards to a larger degree in LBOs than in MBOs (H3)*.

Driven by external financing needs, managers could manipulate asset reserves in LBOs/MBOs. However, if the external financing capacity of a target relies more on general credit conditions than on its own credit characteristics, there may not be a need to manipulate asset reserves. Notably, our sample period coincides with the boom of the high-yield bond market and of CDOs. Therefore, easy access to the debt market may dominate the impact of the balance sheet manipulation.

3. Accounting manipulation proxies and empirical models

3.1. Earnings management proxies

Managers use *accounting procedures* and *estimates* that are conform to GAAP in order to present specific earnings numbers and influence equity valuation (Erickson and Wang, 1999).

It is rather easy to change the earnings by means of accrual manipulation. The presented bottom-line results can also be influenced by real earnings management of which the advantages (relative to accrual management) are: (i) it is less likely to draw auditors' and regulators' attention because real earnings management is related to operating decisions and (ii) there is no manipulation limit. Graham et al.'s (2005) survey reveals that executives are more willing to use earnings management through real activities than accrual management. Hence, we will investigate both types of earnings management.

3.1.1. Accrual management proxies

To measure discretionary (abnormal or manipulated) accruals, regression-based models have been developed for which Dechow et al. (1995) and Balatbat and Lim (2003) demonstrate that the modified-Jones model performs best[7]. Still, Kothari et al. (2005) are concerned that ignoring the financial performance in those regression models leads to spurious results, in particular when companies experience an unusual earnings performance. Therefore, we adopt two approaches: First, we directly add an additional performance control variable to our accrual model in order to exclude abnormal accruals resulting from mean reversion in the performance (or performance momentum). Furthermore, as abnormal accruals measured from this performance-adjusted modified-Jones regression model (PAMJ) may comprise abnormal accruals arising from common manipulation incentives (e.g. compensation incentives or meeting analysts' forecasts) or random effects induced by other events, we further adjust the abnormal accruals for (a) industry average abnormal accruals or (b) average abnormal accruals in the same size group within the same industry[8]. Second, we use a performance-matched approach whereby we match the buyout target with a non-buyout company with the same two-digit SIC code and with the closest performance in the year of the buyout. To recapitulate, we start from total accruals and apply the following: (i) the regression-based model removes the normal accruals from the actual total accruals, the performance-

[7] DeAngelo (1986) uses a random walk model to calculate abnormal accruals and thus assumes that changes in the nondiscretionary part of total accruals equal zero. However, Dechow (1992) empirically shows that there is a significant negative serial correlation in accruals changes. Jones (1991) develops a regression model to predict normal accruals and hence calculate abnormal accruals. Dechow et al. (1995) modify the Jones model by subtracting changes in receivables (which are not exogenous) from changes in sales to predict normal working capital accruals. Dechow and Dichev (2002) use the operating cash flow to calculate abnormal accruals, but this operating cash flow based model only captures working capital induced abnormal accruals and ignores long-term abnormal accruals.

[8] For each year and each two-digit SIC code industry, we divide the control observations portfolio into terciles by ranking firms according to their total assets. We then match the buyout company with the non-buyout companies based on the same size tercile in the same year and the same two-digit SIC code. We name this approach as the same size group matching.

adjustment subtracts the performance-related abnormal accruals, and the mean-adjustment or matched approach excludes the non-event abnormal accruals; (ii) Likewise, the performance-matching removes the normal accruals and makes a performance and non-event accrual adjustment. As a consequence, the remaining part of the abnormal accruals (calculated by means of either approach) captures the industry-adjusted buyout-specific manipulation.

The performance-adjusted modified -Jones regression model (PAMJ)

To measure the PAMJ model, we cross-sectionally estimate the discretionary accruals for each year using all firm-year observations with the same two-digit SIC code. There are important advantages of this approach relative to a time-series one, because PAMJ (i) imposes less restrictions on data - it does not require long time-period accounting information; (ii) partially controls for industry-wide factors which affect total accruals; and (iii) allows the coefficients to vary across time (Kasnik, 1999). Furthermore, Peasnell et al. (2000) state that the cross-sectional model is more able to capture the magnitudes of accrual management. The expectations model is measured as follows:

$$\frac{TACC_{i,t}}{Assets_{i,t-1}} = \beta_0 [\frac{1}{Assets_{i,t-1}}] + \beta_1 [\frac{(\Delta Sales_{i,t} - \Delta Receivables_{i,t})}{Assets_{i,t-1}}] + \beta_2 [\frac{PPE_{i,t}}{Assets_{i,t-1}}] + \beta_3 ROA_{i,t} + \varepsilon_{i,t} \quad (1)$$

where, for fiscal year t and firm i, $TAAC$ stands for the total accruals defined as $TAAC_{i,t} = EBXI_{i,t}\text{-}OCF_{i,t}$, the difference between Earnings Before Extraordinary Items ($EBXI$)[9] and Cash Flow from Operations (OCF)[10]. $\Delta Sale_{i,t}$ and $\Delta Receivables_{i,t}$ stand for changes in sales and receivables, respectively. $PPE_{i,t}$ is gross Property, Plant and Equipment and $Assets_{i,t\text{-}1}$ represents the total book value of assets. Kothari et al. (2005) demonstrates that using contemporary $ROA_{i,t}$ produces less miss-specified tests relative to lagged $ROA_{i,t-1}$. All variables, except $ROA_{i,t}$, are scaled by lagged total assets to mitigate heteroskedasticity in residuals. The normal accruals, $NTAAC_{i,t}$, are then calculated as follows:

$$NTAAC_{i,t} = \tilde{\beta}_0 [\frac{1}{Assets_{i,t-1}}] + \tilde{\beta}_1 [\frac{(\Delta Sales_{i,t} - \Delta Receivables_{i,t})}{Assets_{i,t-1}}] + \tilde{\beta}_2 [\frac{PPE_{i,t}}{Assets_{i,t-1}}] + \tilde{\beta}_3 ROA_{i,t} \quad (2)$$

Hence, the predicted raw abnormal total accruals $RAW\_ABN\_TAAC_{i,t}$ are the difference

[9] Sales minus cost of sales and SG&A expenses give the operating income; adjusting for other operations related revenues and expenses leads to Profit before Interest; minus net interest payable yields the profit before tax; minus tax gives Profit after Tax; and minus minority interest yields the Earnings (or Profit) before Extraordinary items.

[10] Hribar and Collins (2002) state that accrual estimates calculated from balance sheets can be contaminated by measurement error and therefore prefer accruals from cash flow statement. For instance, M&As increase net current assets on the balance sheet, but do not affect the income statement account. Ball and Shivakumar (2008) confirm that the balance sheet approach is biased to upward earnings management and the amount of discretionary accrual is overestimated.

between observed total accruals and normal total accruals:

$$RAW\_ABN\_TAAC_{i,t} = \frac{TAAC_{i,t}}{Assets_{i,t-1}} - NTAAC_{i,t} \quad (3)$$

To remove the non-event specific abnormal accruals, we subtract the mean abnormal accruals of the control observations (firms in the same year and with the same two-digit SIC code) from the raw abnormal accruals, which yields the industry-adjusted buyout-specific abnormal accruals:

$$Madj\_ABN\_TAAC_{i,t} = RAW\_ABN\_TAAC_{i,t} - Mean\_ABN\_TAAC_{i,t} \quad (4)$$

For our robust tests, we will also subtract the mean abnormal accruals of the control observations in the same size group within an industry from $RAW\_ABN\_TAAC_{i,t}$ and label it as $MadjSize\_ABN\_TAAC_{i,t}$.

The performance-matched modified -Jones regression model (PMMJ)

An alternative approach to control for performance consists of adjusting the estimated abnormal accruals by subtracting the estimated abnormal accruals of a performance-matched company. While the notation remains the same as above, we first estimate the expectations model without a performance regressor.

$$\frac{TACC_{i,t}}{Assets_{i,t-1}} = \beta_0 [\frac{1}{Assets_{i,t-1}}] + \beta_1 [\frac{(\Delta Sales_{i,t} - \Delta Receivables_{i,t})}{Assets_{i,t-1}}] + \beta_2 [\frac{PPE_{i,t}}{Assets_{i,t-1}}] + \varepsilon_{i,t} \quad (5)$$

which yields the normal accruals:

$$NTAAC_{i,t} = \tilde{\beta}_0 [\frac{1}{Assets_{i,t-1}}] + \tilde{\beta}_1 [\frac{(\Delta Sales_{i,t} - \Delta Receivables_{i,t})}{Assets_{i,t-1}}] + \tilde{\beta}_2 [\frac{PPE_{i,t}}{Assets_{i,t-1}}] \quad (6)$$

and enables us to calculate the predicted raw abnormal accruals:

$$RAW\_ABN\_TAAC_{i,t} = \frac{TAAC_{i,t}}{Assets_{i,t-1}} - NTAAC_{i,t} \quad (7)$$

We then select for each firm in the buyout year a matched firm from the non-buyout companies with the same two-digit SIC code and with the closest $ROA_{i,t}$. Raw abnormal accruals are calculated for both the buyout samples and the control observations and the difference comprises the industry-adjusted buyout-specific abnormal accruals:

$$ABN\_TAAC_{i,t} = \left(RAW\_ABN\_TAAC_{i,t}\right)_{sample} - \left(RAW\_ABN\_TAAC_{i,t}\right)_{control} \quad (8)$$

3.1.2. Real earnings management proxies

The three most common types of real earnings manipulation comprise: (i) Sales

manipulation; (ii) Production manipulation; and (iii) Expenses manipulation.

Sale manipulation occurs when managers (temporarily) influence earnings and thus the bottom line earnings numbers by changing the sales price or/and credit terms. In a buyout context, managers attempt to lower the sales and thus the earnings by imposing a sales price premium or/and offering less lenient credit terms. For instance, by temporarily reducing lenient credit terms, customers may delay their purchases in the current period. Consequently, the sales decline and the earnings are deflated, but given the tightening of the credit terms, the collection of current period's sales increases which boosts the cash inflow. All in all, the effect of this type of sales manipulation is expected to result in a higher level of operating cash flow.

Prior to the buyout, managers can slow down production in order to reduce net earnings. On the one hand, by producing fewer units, the fixed costs are spread over a small number of units and the fixed cost per unit augments and, since the production is below its optimal scale, the marginal cost per unit rises as well. Hence, the total cost per unit increases, which implies higher reported cost of goods and lower operating margins. On the other hand, the other production and holding costs for inventory decline. As a result, the total production costs, a sum of the cost of goods and changes in inventory, are reduced as the decline in the latter is expected to dominate the increase in the former (Roychowdhury, 2006) which leads to a low ratio of production costs to sales.

Finally, the management can also increase the discretionary expenses by e.g. expanding the selling, general, and administrative expenses (SG&A) to make the current earnings decline[11].

Our approach to estimate the abnormal real activities manipulation is also based on cross-sectional models. We use both performance-adjusted and performance-matched methods to derive industry-adjusted buyout-specific real earnings management proxies.

Sales Manipulation

Our expectations model is formulated as follows:

[11] Given the lack of information on SG&A expenses for the control group, we focus on the first two types of real activities manipulation.

$$\frac{OCF_{i,t}}{Assets_{i,t-1}} = \beta_0 [\frac{1}{Assets_{i,t-1}}] + \beta_1 [\frac{Sales_{i,t}}{Assets_{i,t-1}}] + \beta_2 [\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}}] + \beta_3 ROA_{i,t} + \varepsilon_{i,t} \quad (9)$$

with all the variables as defined above. We obtain the normal operating cash flows ($NOCF_{i,t}$) by means of the β-estimates from the above equation :

$$NOCF_{i,t} = \tilde{\beta}_0 [\frac{1}{Assets_{i,t-1}}] + \tilde{\beta}_1 [\frac{Sales_{i,t}}{Assets_{i,t-1}}] + \tilde{\beta}_2 [\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}}] + \tilde{\beta}_3 ROA_{i,t} \quad (10)$$

To remove the non-event specific abnormal cash flows, we subtract the mean abnormal operating cash flows of the control firms (of the same year and with the same two-digit SIC code) from the raw operating cash flows, which yields the industry-adjusted event-specific abnormal operating cash flows:

$$Madj\_ABN\_OCF_{i,t} = RAW\_ABN\_OCF_{i,t} - Mean\_ABN\_OCF_{i,t} \quad (11)$$

As before, we also use two alternative calculations: we subtract the mean abnormal operating cash flows of the control firms in the same size group within the same industry from $RAW\_ABN\_OCF_{i,t}$ and label it $MadjSize\_ABN\_OCF_{i,t}$. We also use a performance-matched approach: a matched firm is selected by a non-buyout company in the same two-digit SIC code and year with the closest $ROA_{i,t}$. Raw abnormal operating cash flows are calculated for both the sample and the control observations. The difference is the buyout-specific abnormal operating cash flows:

$$ABN\_OCF_{i,t} = \left(RAW\_ABN\_OCF_{i,t}\right)_{sample} - \left(RAW\_ABN\_OCF_{i,t}\right)_{control} \quad (12)$$

Production manipulation

We take the following production cost expectation model as our basis:

$$\frac{PROD_{i,t}}{Assets_{i,t-1}} = \beta_0 [\frac{1}{Assets_{i,t-1}}] + \beta_1 [\frac{Sales_{i,t}}{Assets_{i,t-1}}] + \beta_2 [\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}}] + + \beta_3 [\frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}}] + \beta_4 ROA_{i,t} + \varepsilon_{i,t} \quad (13)$$

where, for fiscal year t and firm i, $PROD_{i,t}$ is the production cost and equals the sum of the Cost of Goods ($COGS_{i,t}$) and the change in Inventory ($\Delta INVENTORY_{i,t}$). The normal production cost is calculated as:

$$NPROD_{i,t} = \tilde{\beta}_0 [\frac{1}{Assets_{i,t-1}}] + \tilde{\beta}_1 [\frac{Sales_{i,t}}{Assets_{i,t-1}}] + \tilde{\beta}_2 [\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}}] + \tilde{\beta}_3 [\frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}}] + \tilde{\beta}_4 ROA_{i,t} \quad (14)$$

$NPROD_{i,t}$ is the normal production cost, calculated from the parameter estimates of the expectations model. As before, to remove the non-event specific abnormal production cost, we subtract the mean abnormal production cost of the control firms (of the same year and with the same two-digit SIC code) from the raw production cost. The industry-adjusted event-

specific abnormal production cost is then:[12]

$$Madj\_ABN\_PROD_{i,t} = RAW\_ABN\_PROD_{i,t} - Mean\_ABN\_PROD_{i,t} \quad (15)$$

3.2. Asset revaluation manipulation proxy

Asset revaluation is calculated as the change in revaluation reserves[13] on the balance sheet (Black *et al.*, 1998; Cheng and Lin, 2009). Asset revaluation reserves' reduction (inflation) in the manipulation year implies downward (upward) revaluation. As revaluations are industry-specific, we further subtract the industry's average revaluation or the average revaluation by the same size group within the same industry from the raw asset revaluation numbers to capture the industry-adjusted buyout-specific abnormal revaluation. As changes in asset reserves may reflect transfers among different reserve accounts, we collect detailed information on revaluation reserves from annual reports and record the frequency of four different types of revaluation while considering transferring reserves: (i) "No change" indicates that the asset revaluation reserves remain the same in both the manipulation and the prior year; (ii) "Upward revaluation" indicates that there are overstated revaluation activities in the manipulation year (relative to the year before the manipulation year); (iii) "Downward revaluation" captures the opposite case, and (iv) "Transfer" refers to the change in revaluation reserves arising from a transfer between the revaluation reserves account and other reserves accounts[14].

3.3. The determinants of earnings management

To analyze the determinants of earnings management, we take the above proxies based on accruals, production, or sales manipulation and relate them to a set of firm, transaction, and industry characteristics which include the choice of the buyout type (MBO versus LBO). This induces a problem as the buyout type choice is not exogenous and can be influenced by the degree of earnings management as well as some firm specific characteristics such as the

[12] We also use two alternative measures: the mean abnormal production cost of the control observations in the same size group within the same industry is subtracted from $RAW\_ABN\_PROD_{i,t}$ and label it as $MadjSize\_ABN\_PROD_{i,t}$. We use a performance-matched approach: a matched firm is selected by a non-buyout company in the same two-digit SIC code and year with the closest $ROA_{i,t}$. Raw abnormal production cost is calculated for both sample and control observations. The difference is proxied as the event-specific abnormal production cost: ABN_PRODi,t=(RAW_ABN_PRODi,t)sample - (RAW_ABN_PRODi,t)control.

[13] Aboody et al. (1999) collect revaluation numbers from companies' annual reports and cross check these numbers with data in Datastream. They report that only three discrepancies related to the 5485 firm-year observations.

[14] For instance, Usborne plc underwent buyout in 1998. The 1997 (1996) annual report showed £32000 (£84000) in the revaluation reserves account. The decline in revaluation reserves by £52000 is not due to revaluation, but arose from transferring out of revaluation reserves account to the P&L reserves account. Although a revaluation decrease could be noted, the sum of the revaluation reserves account and P&L reserves account remained the same and the equity was is not influenced by such transfers.

management's equity stake or the degree of board independence. Given that the realized MBO as a proxy for the management engagement incentive is endogenous determined, we adopt a two-stage instrument variable method. The Zephyr database reveals that the deal initiation takes place almost one year prior to the actual buyout announcement. Furthermore, Ang et al.'s (2010) empirical evidence confirms that the causality is more likely to flow from the buyout decision to earnings manipulation. Therefore, the first stage regression models the buyout choice and the predicted buyout choice will be included in the second stage regression as an explanatory variable of the degree of earnings manipulation.

The MBO versus LBO choice in year *t-1* is a function of the variables at year *t-2*:

$$
\begin{aligned}
&Dum\_MBO_{i,t} = \\
&\beta_0 + \beta_1 Management\ Own_{i,t-2} + \beta_2 Non-Executive\ Own_{i,t-2} \\
&+\beta_3\ Largest\ Owner\ Instit_{i,t-2} + \beta_4\ Independent\ Diretors_{i,t-2} + \beta_5\ Board\ Size_{i,t-2} \\
&+\beta_6\ Analysts_{i,t-2} + \beta_7\ LSE\ Listing_{i,t-2} \\
&+\beta_8\ MTB_{i,t-2} + \beta_9\ ROA_{i,t-2} + \beta_{10}\ Cash\ to\ Assets_{i,t-2} + \beta_{11}\ Debt\ to\ Assets_{i,t-2} + \beta_{12}\ Size_{i,t-2} \\
&+YearFixedeffects + IndustryFixedeffects + \varepsilon_{i,t}
\end{aligned}
\tag{16}
$$

where the dependent variable is the realized buyout type ($Dum\_MBO_{i,t}$ which equals one for an MBO and zero for an LBO). *Management Own*$_{i,t-2}$ and *Non-Executive Own*$_{i,t-2}$ are the respective percentages of equity held by the management team and the non-executive directors. *Largest Owner Instit*$_{i,t-2}$ equals one when the largest shareholder in the buyout company is institutional investors, and zero otherwise. *Independent Directors*$_{i,t-2}$, is the number of independent directors divided by board size. *Board Size*$_{i,t-2}$ is the number of board members. *Analysts*$_{i,t-2}$ is the number of financial analysts following the buyout company. *LSE Listing*$_{i,t-2}$ equals one in case of a listing on the London Stock Exchange (LSE), and zero in case of a listing on the Alternative Investment Market (AIM). *MTB*$_{i,t-2}$ is the Market-to-Book ratio; *Cash to Assets*$_{i,t-2}$ is cash and marketable securities divided by total assets; *Debt to Assets*$_{i,t-2}$ is total debt over total assets, and *Size*$_{i,t-2}$ is the logarithm of total assets.

The choice of variables included in this first stage regression is affected by the reasons for the buyout that are usually mentioned in the official offer documents. As a key reason is "to simplify the management structure to bring it more in line with companies' prospects", we include managerial ownership. Another frequently mentioned reason for a buyout is "to remove costs associated with a listing" as companies with illiquid stocks are not able to attract sufficient investor recognition and the listing costs may therefore outweigh the

benefits. Illiquidity is often linked with high ownership concentration which implies that shareholders intending to dispose of their shares may have little alternative than to sell to the management or a buyout sponsor (Fidrmuc et al., 2013). Therefore, we expect that low visibility (proxied by analyst following and type of market listing) positively correlates to MBOs. The board needs to issue an independent evaluation of possible buyout choices and make a recommendation to investors. Therefore, a more independent board and a stronger ownership stake held by the non-executive directors may imply less collusion with the management, which may reduce the probability of an MBO. Lastly, we also include the cash balance and leverage ratio in the first stage regression.

In the second stage, we replace the MBO dummy by the predicted MBO from the first-step regression.

$$\begin{aligned} Abnormal_{i,t} = \\ \beta_0 + \beta_1 Pred\_Dum\_MBO_{i,t} + \beta_2\ Dum\_External\ Financing_{i,t} + \beta_3 SPPE_{i,t-2} \\ +\beta_4 Dum\_External\ Financing_{i,t} * SPPE_{i,t-2} + \beta_5\ NOA_{i,t-2}(INVREC_{i,t-2}) \\ +YearFixedeffects + IndustryFixedeffects + \varepsilon_{i,t} \end{aligned} \quad (17)$$

The dependent variable $Abnormal_{i,t-1}$ stands for $MadjSize\_ABN\_TAAC_{i,t-1}$ (or $Madj\_ABN\_TAAC_{i,t-1}$ or $ABN\_TAAC_{i,t-1}$), $MadjSize\_ABN\_OCF_{i,t-1}$, and $MadjSize\_ABN\_PROD_{i,t-1}$ which are abnormal accruals/operating cash flows/production costs of the buyout companies adjusted for the mean accruals/operating cash flow/production costs of the same size group. The *management engagement incentive* variable is proxied by $Pred\_Dum\_MBO_{i,t}$. We expect a negative coefficient on this variable because in MBOs managers are expected to manipulate the earnings downwards and benefit from a subsequent low purchase price (relative to LBOs). The variable $Dum\_External\ Financing_{i,t}$[15] proxies for the *external financing incentive* and equals one when the target raises external funds at the transaction. The indicator variable is expected to have a positive sign, as the external financing ability will depend on positive earnings and thus mitigate the downward manipulation. $SPPE_{i,t-2}$ (property, plant and equipment (PPE)) scaled by the beginning total assets) captures the availability of tangible assets that can serve as collateral. The internal manipulation capacity is captured by the net operating assets ($NOA_{i,t-2}$), which is equity minus cash and marketable securities plus total debt (at the beginning of the year), divided by total

[15] We use the dummy variable to ensure the proxy is not driven by the type of financing and extreme values of external funds. Moreover, some transactions only mention that they have external borrowing without releasing the exact amount.

sales (of the previous year). The larger the accumulated $NOA_{i,t-2}$, the lower the possibility to manipulate accruals. The nature of accrual accounting indicates that the total amount of accruals is fixed in the long run. Therefore, managers' opportunistic manipulation in one period has a reverse effect on manipulation in subsequent periods (Barton and Simko, 2002). When earnings are manipulated upwards by accruals, the value of the net assets on the balance sheet increases. All else being equal, the overstated net assets become less efficient at generating a given level of sales in the following periods, which explains the negative relationship between the level of net operating assets and accrual manipulation. The level of the stock of inventories and receivables ($INVREC_{i,t-2}$) captures the managerial flexibility to manipulate real activities. The stock of inventories and receivables is positively correlated with the flexibility to manipulate real earnings (Roychowdhury, 2006). We also add time and industry fixed-effects. All the aforementioned accounting variables are lagged; variable definitions are presented in Table 1.

[Insert Table 1 about here]

4. Data description

4.1. Data source and sample selection

This study comprises all completed whole-company UK buyouts that occurred in the period 1997 to 2007. The period corresponds with the second wave in the UK, which picked up in 1997 and slowed down over the course of time and then fell abruptly with the emergence of the financial crises starting at the end of 2007. The transactions are retrieved from the database of the Mergers and Acquisitions of the Security Data Company's online database (SDC), Venture Expert of Thomson One, Zephyr of Bureau van Dijk, Centre for Management Buyout Research (CMBOR), and Capital IQ. All deal information has been cross-checked by means of these datasets. To identify whether at least one member of the current management team participates in the transaction and stays in the firm subsequent to the buyout (our definition of an MBO), we gather the deal's details from the above datasets as well as from the news releases in the Factiva, LexisNexis, Google news, and the offer documents. The accounting data is mainly obtained from DataStream (DS), but we complement missing information by the annual reports downloaded from Thomson One and Fame. Corporate governance proxies are collected from annual reports and external financing information are gathered from the offer documents (also downloaded from Thomson One).

We collect a total of 407 buyout transactions and retain 168[16] public-to-private transactions which satisfy the following criteria:

- We retain 353 whole-company public-to-private buyouts (PtP buyouts): 14 private-to-private buyouts and 32 divisional buyouts are dropped for reasons of data limitations. Eight companies that still remained public companies were also not included in the final database.
- Missing data in Datastream reduced the sample to 299 buyouts.
- We excluded the financial services industry (SIC codes 6000-7000) and the regulated industries (SIC codes 4400-5000), which reduced the sample to 233.
- We faced problems with availability or quality of (accounting) information (in spite of disposing of the offer documents) and reduced the sample to 199 (ten companies had no SIC code; for twelve firms the net CF information was unavailable; ten firms lacked information on receivables; and two did not disclose any information on PPE).
- As small companies are exempt from external auditing, we exclude these three firms, hence retaining a sample of 196 firms.[17]
- The inability to find a matching control firm leaves a sample of 178.
- We dropped ten observations, because we required at least 10 observations in each two-digit SIC industry per year to ensure the statistic power in the cross-sectional regressions. In the remaining 168 observations, we have all the necessary data to calculate the various accounting manipulation proxies for 163 transactions.

4.2. Data description

Panel A of Table 2 shows the distribution of buyouts over time: the number of the buyouts has risen since 1997 and peaked around 1999-2000, consistent with Wright's et al. (2009) evidence that UK LBOs reached a new record in 2000 with total value of 38.4 billion euro. Following the stock market downturn of early 2000, the buyout market rebounded in late 2002 and 2003. Our sample includes companies from a wide business spectrum with most buyouts occurring in business services, retailing, and manufacturing industries. In the high-

[16] This is not a small sample in the light of the US research on MBO/LBOs: DeAngelo's (1986) sample consists of 64 MBOs (1973-1982). Perry and Williams' (1994) study includes 175 MBOs (1981-1988), and Fischer and Louis' (2008) sample has 138 observations (1985-2005). Ang et al. (2010) study 163 MBOs (1997-2007). These US studies only require a minimum of 5 observations for their cross-sectional regressions, but we adopt more strict requirements for our cross-sectional regressions.

[17] According to Company Act 2006, small companies are those with (a) Turnover < 2.8million GBP& Total assets <1.4million GBP (Before 2004) and (b) Turnover<5.6million GBP & Total assets < 2.8million GBP (Since 2004).

tech industry, more buyouts have occurred (accounting for almost 14% of the total transactions). This trend is in conjunction with Kaplan and Strömberg's (2009) view that the industry scope of buyouts is broadening beyond the mature, high cash flow, high debt capacity type of industries.

[Insert Table 2 about here]

The total assets of the average sample firm equal GBP 171.34 million in the year prior to the buyout. MBOs are relatively smaller, faster growing, less levered, but more cash-rich companies than LBOs. In two thirds of our buyout sample, at least one incumbent manager is involved in the transaction and stays on subsequent to the buyout-when we label the transaction as an MBO. MBOs are associated with a large ex ante equity stakes held by managers (18.3% versus only 6.0% in LBOs) and the management is more frequently the largest shareholder. Institutional ownership concentration does not differ between MBOs and LBOs. LBOs have a higher proportion of independent directors than MBOs (47.82% versus 43.68%) and are followed by twice as many analysts[18].

5. Results

5.1. Earnings manipulation

5.1.1. Accrual management

We first calculate normal (or expected) accruals by means of the performance-adjusted modified-Jones model (Panel A of Table 3) which is based on 163 cross-sectional regressions. The factor most influencing the expected total accruals is the scaled *PPE* (β_2), the long-term component of total accruals. Expectedly, this parameter estimate is negative, because *PPE* is related to depreciation which negatively contributes to total accruals. Of the 163 cross-sectional regressions, 87.20% of the scaled PPE's coefficients are significant at the conventional levels. The coefficient on the change in net sales (β_1) is negative and insignificant in more than half of regressions. More importantly, $ROA_{i,t}$ plays a significantly positive role (β_3) as a control variable, which justifies the performance adjustment in the modified-Jones model. The concern that $ROA_{i,t}$ partially captures the effect of sales is not substantiated, as their correlation is low and insignificant. The model's mean adjusted R^2 for the 163 cross-sectional expectation models amounts to 47.2% (significantly higher than the non-performance-adjusted Jones model with an R^2 of only 27.0%).

[18] The correlation between all independent variables is small (below the absolute value of 0.5) with exception of a positive correlation of 0.6 between the number of analysts following the firm and firm size. To avoid multicollinarity, these variables are not simultaneously included in the same model.

When we compare the real total accruals with the predicted ones from Panel A, resulting in the raw abnormal total accruals (*RAW_ABN_TAAC*) of Panel B of Table 3, we observe that buyout companies have negative total raw accruals (-3%). This degree of downward accrual management is comparable with the US literature (Perry and Williams, 1994; Fisher and Louis, 2008). Both MBOs and LBOs have negative accrual management (-3% and -2%, respectively, but the difference is not significant; Panel B of Table 3). When we adjust the raw abnormal accruals for the industry-mean total accruals or for the mean of the same industry size group, we can draw two conclusions: (i) the abnormal accrual figures become significantly more negative: for all buyout companies, they decline from -3% to -12%. This implies that non-buyout companies are generally subject to positive accrual management (by 9% of the assets). This finding is unsurprising, because positive manipulation can affect managers' bonuses and the likelihood of meeting or beating analysts' expectations which may trigger a positive market reaction. (ii) The difference in industry-adjusted abnormal accruals of MBOs and LBOs is striking: downward accrual management is twice as high in MBOs (-15%) than in LBOs (-7%).

In sum, from the analysis of the industry-adjusted buyout-specific accruals approaches, we reach these conclusions: (i) In spite of the improved corporate governance over the past 15 years (Guo et al., 2011) and enhanced accounting regulation, downward earnings management preceding buyouts still frequently takes place, as indicated consistently by three types of accrual proxies. (ii) MBOs are associated with larger deflated accrual manipulation than LBOs. The industry-mean adjusted abnormal accruals of MBOs account for approximately 29% of reduced earnings and are thus not only statistically but also economically significant. LBOs are also associated with negative earnings management as well which may very well be the consequence of the 'love letters' sent by bidding companies: when managers cooperate with buyout sponsors to help reduce the transaction value, the losses of reduced premiums for managers may be compensated by the monetary rewards offered by bidding companies. The findings of this subsection strongly support hypothesis 1 (*managerial engagement hypothesis*) that managers deflate earnings numbers by means of accrual management.

[Insert Table 3 about here]

As a robustness check, we use a performance-matched modified-Jones regression model,

which controls for the effect of performance on accruals by assigning to each target a non-buyout counterpart from the same industry and a performance profile that is similar in the manipulation year. The difference in abnormal accruals of the buyout targets and that of control companies yields peer-controlled abnormal accruals. The results of this analysis yields very similar results[19]: for both MBOs and LBOs, the downward accruals manipulation is significantly negative, but the manipulation in MBOs is even much larger (about eight times) than in LBOs.

5.1.2. Real earnings management

We turn to real earnings management and focus on sales and production manipulation. The expectations model for the former is presented in Panel A of Table 4. The contemporaneous sales are, as expected, strongly positively correlated to the operating cash flows (OCF), and so is ROA. The explanatory power of the model is high with an average adjusted R^2 of 73.17%. Panel B of Table 4 indicates that the abnormal operating cash flows are positive for both MBOs and LBOs targets, which is in line with the prediction that managers will delay sales to depress net income by using real earnings management. For instance, a reduction in lenient credit terms will decrease the sales volumes and therefore lead to low earnings number, but will increase the collection of current sales' receipts and thus raise the level of OCF. We observe that sales manipulation is carried out in MBOs (the four proxies are statistically significantly different from zero), but the evidence for LBOs is weaker. This finding supports hypothesis 1 that managers manipulate earnings downward by delaying sales. One further point regarding our industry-adjusted buyout-specific approaches needs to be made: since both the industry-mean adjusted OCF and the same industry-size group adjusted OCF are lower than the raw OCF, it implies that the industry peers (the non-MBO and non-LBO firms) engage in negative sales manipulation, which is used to boost earnings numbers. This is consistent with the motive of positive accrual management used by the industry peers for increasing the bonus or meeting/beating analyst forecast.

[Insert Table 4 about here]

In relation to production manipulation, we observe that sales are a key predictor of the production costs (Panel A of Table 5). This coefficient's magnitude (0.75) is comparable with that Roychowdhury's (2006) model, namely (0.78) and the sign of sales is positive, as expected. The adjusted R^2 amounts to 96.61%. Panel B of Table 5 further supports hypothesis

[19] The results are not shown for reasons of conciseness; tables are available upon request.

1, in that negative production manipulation occurs prior to buyouts, which leads to lower earnings figures. That is, managers intend to slow down production to manage earnings downwards. We also disclose that MBOs are related to significant under-production manipulation, while production manipulation in LBOs does not occur according to the industry-adjusted buyout-specific and the matching-adjusted approaches. Buyout targets decrease production while industry competitors increase production to inflate the earnings numbers, which is consistent with the role of positive accrual management and negative sales manipulation.

[Insert Table 5 about here]

In sum, in addition to the downward accrual management, we present further evidence on negative real earnings management preceding buyout transactions. What is more, MBOs are associated with more negative earnings manipulation relative to LBOs. Hypothesis 1 is supported by both accrual management and real earnings management.

Since accrual management and real earnings management may be correlated, we report the correlation matrix in Table 6. Abnormal accruals and abnormal cash flows are significantly negatively correlated, which implies that companies are engaging in accrual management and real earnings management at the same time. Likewise, the negative correlation between abnormal cash flows and abnormal production costs suggests that both types of real earnings management are initiated by the average MBO.

[Insert Table 6 about here]

5.2. Asset revaluation manipulation

Whereas in LBOs, upward asset revaluation takes place, this is not the case in MBOs (as reflected in the abnormal revaluation numbers of Panel A of Table 7). Given that asset revaluation is industry-specific (industries with high capital intensity can revalue their assets to a larger extent), we control for industry effects by adjusting the raw figures for (i) the industry mean; (ii) the mean of the same industry-size group, and (iii) peer-effects by employing a matched control sample of non-buyouts. These three adjustments consistently show that managers do not manipulate the value of the assets through revaluation in MBOs, but do so in case of LBOs. In the context of the results of the previous subsection, a logical explanation is that MBO managers intend to keep corporate value as low as possible. In contrast, LBO managers who anticipate that they will not be involved in the post-LBO phase can facilitate the buyout by revaluing the assets upwards which reduces the debt-to-equity

ratio and in turn increases the debt capacity of the un-levered transaction.

When we dig deeper into the components of the asset revaluation reserves and distinguish between pure asset revaluation changes and the changes following the transfers of asset revaluation reserves to other reserve accounts, we show in Panel B of Table 7 that although MBO managers have an incentive to revaluate their assets downwards, they do not do so in 70.30% of the cases. The main reason is that of these 70.30% of the MBOs, 87% are not able to decrease the revaluation reserves because their asset revaluation reserves were already at zero prior to the buyout.

In short, when we examine the abnormal revaluation reserves, LBOs are associated with more frequent upward revaluations than MBOs. This partially supports the Hypothesis 2 of external financing incentive: upward revaluations are used to increase the borrowing capacity by ex ante reducing the debt-to-equity ratio. It also provides evidence on Hypothesis 3 that LBOs are associated with more upward revaluation than MBOs. However, it should be noted that the evidence is not very strong as in absolute terms, neither the MBOs nor the LBOs frequently revalue their assets. The reason may be that when credit markets are booming, revaluations are not really necessary.

[Insert Table 7 about here]

5.3. Robustness tests

To evaluate the robustness of our primary findings on accounting manipulation, we conduct four robustness checks.

First, it is possible that the management has made the manipulation decision not in the year or months prior to the buyout transaction but at an earlier time. Therefore, we measure all accounting manipulation proxies at a time preceding the transaction by more than one year (the fiscal year is then ending 13 to 24 months prior to the buyout). Overall, we hardly find any significant results for the year prior to what we call the manipulation year. If there is evidence of accounting manipulation or asset revaluation, it occurs immediately preceding the buyouts[20].

Second, we examine whether the enactment of the revised UK Corporate Governance Code

[20] This finding also partially supports the expectation that the causality is more likely to go from the buyout decision to earnings manipulation and not the other way around. Tables with results are available upon request.

of 2003 reduces the degree of accounting manipulation. Following the introduction of Sarbanes-Oxley (SOX) Act of 2002, the 'Combined Code' of 1998 was revised in 2003 to improve financial reporting quality and the accountability of the board of directors, the audit committees, and the auditors. We partition the sample period into two subperiods: 1997-2003 and 2004-2007. From the abnormal accruals part of Table 8, we discover that active accrual manipulation was larger before the change in corporate governance regulation (the 1997-2003 subperiod), although it still takes place subsequent to 2003. In contrast, the other manipulation techniques (related to production costs and asset revaluations) are more frequently used after the change in the accounting regime, which may be induced by the fact that these manipulation methods are more difficult to detect. This finding is also consistent with US evidence: since the adoption of SOX, companies shift from accrual management to real earnings management (Cohen et al., 2008). When we redo the above tests for the sample of MBOs only, we find that the above findings are upheld.

[Insert Table 8 about here]

Third, we base our tests on the differences between the medians for the MBOs and LBOs (for the panels B of the Tables 3-5 and 7) and find that the results are very similar[21].

Fourth, we also perform a time-series approach to estimate abnormal accruals, operating cash flows and production costs. For each individual buyout company, we run a time-series regression using company data over a six year period ending in the year before the manipulation year to measure the normal accruals, operating cash flows, and production costs, and hence both accrual and real earnings management. The limitation of this method is that a sufficiently long time series (we take at least six years) of accounting numbers prior to the manipulation period ought to be available for each firm in order to estimate the parameter coefficients. Although this approach reduces the sample size to 72 observations, we still find negative accrual management preceding MBOs.

5.4. The determinants of earnings manipulation

In this section, we concentrate on the question why firms resort to accounting manipulation: does the management engagement incentive dominate or the external financing reason?

5.4.1. Managerial incentives versus external financing reasons

[21] For the sake of brevity, the results are not reported; tables are available upon request.

It is important to note that when we relate the earnings manipulation variables to the MBO/LBO dummy variable, the latter captures the ex ante probability of management engagement but measures it with error. Some companies consider an MBO but end up with an LBO which imposes a bias on the resulting coefficients from the probit models. Furthermore, the type of buyout is not exogenous to the degree of earnings manipulation. To address these concerns, we make use of a stage instrumental variables method. The first-stage equation models the MBO choice and the second equation explains the accounting manipulation behavior. So, we test whether or not managers manipulate earnings when they perceive the buyout type. As suggested by Berry (2011), an OLS model is preferred in the first stage even for an independent dummy variable, the reason being that only OLS estimation produces first stage residuals that are uncorrelated with the covariates and fitted values. As a robustness check, we will also employ a probit model for the first stage estimation following Wooldridge (2002).

We choice a set of instrumental variables (IVs) based on the economic rationale underlying the buyouts: managerial ownership concentration, non-executive ownership concentration, and firm size. Panel A of Table 9 demonstrates that these IVs are significantly related to the MBO decision. The higher is the manager's equity investment in the target company, the higher probability of an MBO. When the level of non-executive ownership is higher and the target firm is larger, the company is more likely to undergo an LBO. Smaller firms are more likely to be acquired through an MBO. The Hausman endogeneity test rejects the null hypothesis that the realized buyout type is exogenous. A p-value of 0.26 from overindentifying restriction test indicates that at least one of the IVs is exogenous. To test the relevance of the IVs, the F-statistics are required to be larger than 10 to avoid weak IVs; our F-test amounts to 18.4 which implies that our IVs are characterized by a sufficiently large correlation with the endogenous regressor.

The main finding of the second stage is that the predicted MBO proxy is significantly negatively related to the abnormal accruals (Model (1) of Panel B of Table 9) and a positive relation with sales manipulation (Model (2)). Both these findings support Hypothesis 1 in that managers are more prone to participate in accounting manipulation in order to obtain a lower purchase price via both accrual and real earnings manipulation. In case of an MBO, the mean abnormal accruals is 18.4% of total assets lower than the accruals of firms of the same size

group and within the same industry. This decrease leads to a decline in earnings by 30%, which is also economically significant. The external financing incentive does not emerge as a reason for accrual or real earnings manipulation. The reason for its insignificance may be that over the period 1997 to 2007 a fast-growing high-yield bond market emerged (the GBP 5.4 billion high-yield bond market of 1997, soared to 32 billion in 2007). Axelson et al. (2013) argue that the main robust predictor of buyout leverage consists of the credit market conditions of the high-yield bond market. Thus, our Hypothesis 2 on the external financing incentive is not upheld. The inactive revaluation frequency presented in Panel B of Table 7 is squared with this finding.

[Insert Table 9 about here]

5.4.2. Robustness tests

To verify the results of the above subsection, we perform four robustness tests.

First, as an alternative dependent variable for accrual management, we use the performance-matched abnormal accruals (see Section 3). The perceived MBO probability still has a significantly negative impact on accrual manipulation (-0.151 in Model (1) of Table 10). When we use either the raw abnormal operating cash flow (OCF) or the industry mean adjusted OCF as a proxy for sales manipulation, the perceived MBO remains positive and statistically significant (0.077 in Model (2)).

Second, we use two alternative estimation approaches. In the first stage, we use a probit model (rather than OLS) to predict the MBO likelihood and then use this predicted value as a regressor in the second stage. We confirm that the management engagement incentive plays a crucial role in negative accrual manipulation (Model (3)). We also apply a GMM IV approach and obtain a coefficient for the predicted MBO (-0.186 in Model (4)) which happens to be similar to that that of the two-stage approach (-0.184). As the standard errors are close, there is almost no efficiency gains from GMM approach relative to a two-staged method.

Third, we explore the effect of the enactment of the revised UK Corporate Governance Code of 2003 on both accrual and real activity manipulation. Model (5) of Table 10 shows that the implementation of the revised Code (as captured by the interaction term) mitigates the magnitude of manipulation in the case of an MBO. This suggests that the revised Code has

improved the financial statement quality of a potentially problematic group of firms. Model (6) estimates the effect of the revised Code on sales manipulation. After the Code's revision, the real earnings manipulation in predicted MBOs is reduced as well. Taking these two pieces of evidence on accrual and real earning manipulations together, we could argue that the revised Code enhances the reporting integrity of suspected companies during the MBO event, which could therefore lead to more fair and transparent transactions.

Fourth, to verify that the causality goes from the buyout decision to earnings management, we estimate the realized buyout type dummy variable on different proxies for earnings manipulation in addition to factors influencing buyout choice. In untabulated results, we do not find any significant impact of earnings management on the choice of buyout type. The key determinants remain management equity ownership, non-executive shareholdings and company size.

[Insert Table 10 about here]

6. Conclusions

In this paper, we investigate accounting manipulation prior to buyout transactions in the UK during the second buyout wave of 1997 to 2007 (when the buyout market collapsed following the banking crisis). We find that buyout targets engage in negative earnings manipulation, through both accrual management and real earnings management. Moreover, MBOs (wherein at least one member of the management team will be involved in the subsequent buyout) are associated with significantly more manipulation relative to LBOs. This is not unexpected: when the management contemplates an MBO, negative earnings manipulation may negatively influence the acquisition price. This is evidence of managerial self-dealing. Our managerial engagement incentive hypothesis is strongly supported for UK MBOs. However, the external financing incentive (increasing earnings and cash flows may lead to higher valuation which may enable the firm to be acquired with more leverage) does not play a prominent role in our UK buyout setting. This finding is in line with the evidence of Axelson et al. (2013) in that the buyout leverage is not determined by standard capital structure factors. Manipulation through inactive asset reserves revaluation is also consistent with the insignificance of the external financing incentive. We also document that the implementation of the revised UK Corporate Governance Code (of 2003) leads to increases in real earnings manipulation in general.

Our study extends the related research along four dimensions. First, while the first US LBO wave of the 1980s is well analyzed, little evidence is provided on the accounting manipulation during the second LBO wave and outside the US. We show that accounting manipulations ahead of the UK buyouts still prevail. Second, we advance an industry-adjusted buyout-specific approach to have a better proxy for accounting manipulation. The industry adjustment removes the common components of abnormal accounting numbers and allows for varied accounting discretion across industries. We further compare manipulation in MBOs and LBOs to examine buyout-event specific abnormal earnings behavior. Third, to explore the effect of competing incentives on accounting manipulation, we address the endogeneity issue of the ex-post buyout type by using the two-stage IV approach. We show that the causality goes from the decision of the buyout to accounting manipulation rather than vice versa. Fourth, we evaluate the policy effect of the revision of UK Corporate Governance Code on reporting quality. Even through self-interested managers still attempt to maximize their wealth through accounting manipulation, the magnitude of manipulation in MBOs is mitigated after the implementation of the revised UK Corporate Governance Code.

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Table 1: Definition of Variables

Table 1 defines the variables and presents the data sources. t stands for the buyout year, t-1 for the manipulation year, and t-2 is the year preceding the manipulation year.

Panel A: Dependent variables

Variables	Definition	Source
First stage regression dependent variable		
Dum_MBO	Dummy variable equals 1 in case of an MBO (at least one member of the pre-transaction management team participates in the buyout and subsequently stays in the firm), and 0 in case of an LBO (without subsequent involvement of the incumbent management) otherwise.	SDC, Capital IQ, Zephyr, Venture Expert and news release.
Second stage regression dependent variable		
ABN_TAAC	Matched Abnormal Accruals: raw abnormal accruals minus abnormal accruals of matched control observations selected from non-buyout companies with same two-digit SIC code and in same year and with closest ROAi,t.	Calculations with DataStream data
MadjSize_ABN_TAAC	Industry-Size Mean Adjusted Abnormal Accruals: raw abnormal accruals minus mean abnormal accruals of the control observations for same year and with same size group at same two-digit SIC code.	Calculations with DataStream data
MadjSize_ABN_OCF	Industry-Size Mean Adjusted Abnormal Operating Cash Flow: raw abnormal operating cash flow minus mean abnormal operating cash flow of control observations for same year and with same size group at same two-digit SIC code.	Calculations with DataStream data
MadjSize_ABN_PROD	Industry-Size Mean Adjusted Abnormal Production Cost: raw abnormal production costs minus mean abnormal production costs of control observations for same year and with same size group at same two-digit SIC code.	Calculations with DataStream data
RAW_ABN_OCF	Raw Abnormal Operating Cash Flow.	Calculations with DataStream data

Panel B: First stage regression independent variables

Variables	Definition	Source
Analysts	Number of financial analysts following pre-buyout target.	DataStream
Board Size	Number of directors on the board.	Annual reports
Cash to Assets	Cash and Marketable Securities divided by total assets of (pre-buyout) target.	Annual report
Debt to Assets	Total debt divided by total assets of (pre-buyout) target.	Annual report
Independent Directors	Proportion of independent directors on the board.	Annual reports
Largest Owner Instit	Dummy variable equals 1 if an institutional investor is the largest shareholder in pre-buyout target and 0 otherwise.	Annual reports
LSE Listing	Dummy variable equals 1 when listed on the London Stock Exchange, and 0 when listed on the Alternative Investment Market.	DataStream
Management Own	Ownership stake (%) held by management in pre-buyout target.	Annual reports
MTB	Market-to-book value of (pre-buyout) target.	DataStream
Non-Executive Own	Ownership stake (%) held by non-executives in pre-buyout target.	Annual reports
ROA	Return on assets of (pre-buyout) target.	Annual report
SIZE	Logarithm of total assets of (pre-buyout) target.	Annual report

Panel C: Second stage regression independent variables

Variables	Definition	Source
Dum_External Financing	Dummy equals 1 if pre-buyout target raises external funds and 0 otherwise.	SDC, Capital IQ, Zephyr, Venture Expert and offer documents.
INVREC	Sum of inventories and receivables, divided by total assets.	DataStream
NOA	Net operating assets: Sum of shareholders' equity minus cash and marketable securities and plus total debt, divided by total sales.	DataStream
Pred_Dum_MBO	Predicted MBO obtained from first stage regression (of 2SLS model).	
SPPE	Total Fixed Assets or gross Property, Plant and Equipment (PPE) of pre-buyout target, divided by lagged total assets.	DataStream and Annual reports
YearCode	Dummy variable equals 1 if buyout year is after the implementation of the revised Corporate Governance Code in 2003 and zero otherwise.	DataStream

Table 2: Sample Description

This table reports the distributions of UK buyouts by year (panel A) and by industry (panel B) over the period 1997 (the start of the second MBO/LBO wave) to 2007 (when the MBO/LBO market severely declines following the financial crises). The industries are classified based on the Fama-French 10 industry classification. The financial services industry and the utilities' sector are excluded. We further divide Fama-French's "Others" category into the business service industry and construction industry, such that we end up with nine industry categories. Sources: CMBOR, SDC, Venture Expert, Zephyr and Capital IQ.

Panel A: Distribution of leveraged (management) buyouts over time

Year	Number	Percent (%)
1997	4	2.5
1998	19	11.7
1999	36	22.1
2000	22	13.5
2001	11	6.8
2002	13	8.0
2003	17	10.43
2004	8	4.91
2005	10	6.13
2006	13	7.98
2007	10	6.13
Total	163	100

Panel B: Distribution of leveraged buyouts across industries

Industry	Number	Percent (%)
Consumer NonDurables	17	10.4
Consumer Durables	6	3.7
Manufacturing	27	16.6
High-Tech	22	13.5
Wholesale, Retail, and Some Services	42	25.8
Healthcare, Medical Equipment, and Drugs	4	2.5
Business Services	36	22.1
Construction	9	5.5
Total	163	100.0

Table 3: Accrual Management (Performance-Adjusted Modified-Jones Model)

Raw abnormal accruals are measured by the difference between actual total accruals and the estimated accruals from the expectation model. Panel A presents the expected accruals that are obtained from the following expectations model:

$$\frac{TAAC_{i,t}}{Assets_{i,t-1}} = \beta_0 \left[\frac{1}{Assets_{i,t-1}}\right] + \beta_1 \left[\frac{(\Delta Sales_{i,t} - \Delta Receivables_{i,t})}{Assets_{i,t-1}}\right] + \beta_2 \left[\frac{PPE_{i,t}}{Assets_{i,t-1}}\right] + \beta_3 ROA_{i,t} + \varepsilon_{i,t}$$

where, for fiscal year t and firm i, *TAAC* is the total accruals defined as $TACC_{i,t} = EBXI_{i,t}\text{-}OCF_{i,t}$, (Earnings before Extraordinary Items (*EBXI*) minus Cash Flow from Operating activities (*OCF*)). $\Delta Sale_{i,t}$ stands for the change in Sales, $\Delta Receivables_{i,t}$ is the change in Receivables, and $PPE_{i,t}$ is the gross Property, Plant and Equipment. $Assets_{i,t-1}$ represents the book value of Total Assets. Performance is measured by $ROA_{i,t}$. All variables (except *ROA)* are scaled by lagged total assets to mitigate heteroskedasticity in residuals. In panel B, the industry mean-adjusted abnormal accruals ($Madj\_ABN\_TAAC_{t-1}$) are calculated by subtracting the mean abnormal accruals of the control observations in the same year and within the same two-digit SIC code from the raw abnormal accruals ($RAW\_ABN\_TAAC_{t-1}$). Industry-size mean adjusted abnormal accruals ($MadjSize\_ABN\_TAAC_{t-1}$) are calculated by subtracting the mean abnormal accruals of the control observations falling in the same industry-size group from the raw abnormal accruals. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.

Panel A. Descriptive statistics

All companies	Mean	Median	St.Dev	Min	Max
β_0	-35.43	30.21	765.49	-4389.51	2982.24
t test	(0.09)	(0.13)	(1.74)	(8.58)	(7.77)
β_1	-0.03	-0.02	0.10	-0.33	0.42
t test	(0.67)	(0.50)	(1.94)	(10.48)	(8.33)
β_2	-0.09	-0.09	0.04	-0.22	0.03
t test	(4.01)	(3.68)	（2.30）	(11.16)	(0.64)
β_3	0.41	0.39	0.28	-0.38	1.13
t test	(3.38)	(2.81)	(2.97)	(6.11)	(14.92)
Adj. R^2 (%)	47.18	50.32	22.18	5.75	95.29

Panel B. Performance-adjusted regression-based abnormal accruals

Abnormal accruals	Total	MBO	LBO	Diff
$RAW\_ABN\_TAAC_{t-1}$	-0.03***	-0.03***	-0.02***	-0.01
$Madj\_ABN\_TAAC_{t-1}$	-0.12***	-0.14***	-0.07***	-0.07***
$MadjSize\_ABN\_TAAC_{t-1}$	-0.12***	-0.15***	-0.07***	-0.08***
Nr. of observations	163	108	55	

Table 4: Sales Manipulation

The raw abnormal operating cash flows ($RAW\_ABN\_OCF_{t-1}$) are measured by the difference between actual total operating cash flows and the estimated cash flows from an expectation model of which the results are presented in Panel A:

$$\frac{OCF_{i,t}}{Assets_{i,t-1}} = \beta_0 \left[\frac{1}{Assets_{i,t-1}}\right] + \beta_1 \left[\frac{Sales_{i,t}}{Assets_{i,t-1}}\right] + \beta_2 \left[\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}}\right] + \beta_3 ROA_{i,t} + \varepsilon_{i,t}$$

In panel B, the industry-mean adjusted abnormal cash flows ($Madj\_ABN\_OCF_{t-1}$) are calculated by subtracting the mean abnormal operating cash flows of the control observations (from the same year and within the same two-digit SIC code) from the raw abnormal cash flows. Industry-size mean adjusted abnormal cash flows ($MadjSize\_ABN\_OCF_{t-1}$) are obtained by subtracting the mean abnormal cash flows of the control observations falling in the same industry-size group from the raw abnormal cash flows. Matching-adjusted abnormal operating cash flows (ABN_OCF_{t-1}) consist of the difference in abnormal operating cash flows between the sample buyouts and control firms (each target is matched with a non-buyout control company with the closest $ROA_{i,t}$ and with the same two-digit SIC code and for the same year). ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.

Panel A. Descriptive statistics

All companies	Mean	Median	St.Dev	Min	Max
β_0	53.4	-80.22	1073.62	-4010.94	9049.37
t test	(0.17)	(0.33)	(1.60)	(3.88)	(4.29)
β_1	0.04	0.03	0.03	-0.01	0.12
t test	(3.35)	(2.79)	(2.21)	(0.25)	(10.24)
β_2	-0.02	-0.02	0.11	-0.43	0.31
t test	(0.47)	(0.36)	(1.73)	(6.58)	(4.13)
β_3	0.61	0.62	0.28	-0.19	1.53
t test	(4.99)	(3.77)	(4.59)	(0.66)	(35.44)
Adj. R2 (%)	73.17	76.31	17.98	4.82	97.92

Panel B. Abnormal operating cash flows

Abnormal operating CF	Total	MBO	LBO	Diff
$RAW\_ABN\_OCF_{t-1}$	0.03^{***}	0.03^{**}	0.02^{**}	0.01
$Madj\_ABN\_OCF_{t-1}$	0.02^{***}	0.02^{***}	0.02^{*}	0.00
$MadjSize\_ABN\_OCF_{t-1}$	0.02^{***}	0.02^{***}	0.01	0.01
ABN_OCF_{t-1}	0.02^{***}	0.03^{***}	0.01	0.02
Nr. of observations	163	108	55	

Table 5: Production Manipulation

The raw abnormal production costs ($RAW\_ABN\_PROD_{t-1}$) are measured by the difference between actual total production costs and the estimated production costs from an expectation model of which the results are presented in panel A:

$$\frac{PROD_{i,t}}{Assets_{i,t-1}} = \beta_0 \left[\frac{1}{Assets_{i,t-1}}\right] + \beta_1 \left[\frac{Sales_{i,t}}{Assets_{i,t-1}}\right] + \beta_2 \left[\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}}\right] + \beta_3 \left[\frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}}\right] + \beta_4 ROA_{i,t} + \varepsilon_{i,t}$$

In Panel B, the Industry-mean adjusted abnormal production costs ($Madj\_ABN\_PROD_{t-1}$) are calculated by subtracting the mean abnormal production costs of the control firms (within the same two-digit SIC code and of the same year) from the raw abnormal production costs. The industry-size mean adjusted abnormal production costs ($MadjSize\_ABN\_PROD_{t-1}$) are calculated by subtracting the mean abnormal production costs of the control firms (falling in the same industry-size group as the target firms) from the raw abnormal production costs of the target buyouts. The matching-adjusted abnormal production costs (ABN_PROD_{t-1}) consist of the difference in abnormal production costs between the sample firms and the control firms. We match each target buyout with a non-buyout control company with the closest $ROA_{i,t}$ and in the same two-digit SIC code and year. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.

Panel A. Descriptive statistics

All companies	Mean	Median	St.Dev	Min	Max
β_0	-2373.5	-1419.8	5900.4	-49035	10780.9
t test	(1.97)	(1.67)	(2.28)	(9.89)	(2.91)
β_1	0.75	0.75	0.11	0.39	0.99
t test	(18.62)	(16.48)	(12.24)	(2.23)	(88.56)
β_2	0.1	0.1	0.41	-1.27	3.34
t test	(0.67)	(0.68)	(1.64)	(4.09)	(4.75)
β_3	-0.08	0.00	0.38	-1.82	0.51
t test	(0.18)	(0.08)	(1.58)	(4.93)	(4.05)
β_4	-0.52	-0.53	0.64	-2.14	2.99
t test	(1.28)	(1.15)	(1.47)	(8.14)	(2.10)
Adj. R^2 (%)	96.61	97.47	2.42	89.73	99.87

Panel B. Abnormal production costs

Abnormal production costs	Total	MBO	LBO	Diff
$RAW\_ABN\_PROD_{t-1}$	-0.06**	-0.07**	-0.04	-0.03
$Madj\_ABN\_PROD_{t-1}$	-0.03*	-0.04**	0.01	-0.02
$MadjSize\_ABN\_PROD_{t-1}$	-0.03	-0.04*	0.00	-0.03
ABN_PROD_{t-1}	-0.06	-0.06*	-0.02	-0.04
Nr. of observations	159	104	55	

Table 6: Correlation Matrix for Earnings Management Proxies

We present the Pearson correlation matrix between accrual and real earnings management proxies. *MadjSize_ABN_TAAC$_{t-1}$* is industry-size mean adjusted abnormal accruals (obtained by subtracting the mean abnormal accruals of the control firms of similar size (in the same year) and within the same two-digit SIC code) from the raw abnormal accruals. *MadjSize_ABN_OCF$_{t-1}$* is the industry-size mean adjusted abnormal operating cash flows. MadjSize*_ABN_PROD$_{t-1}$* is the industry-size mean adjusted abnormal production costs. Panel A shows the matrix based on all buyouts. Panel B (C) shows the matrix for MBOs (LBOs). ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.

Panel A. Correlation matrix for all buyouts

All LBOs (163)	MadjSize_ABN_TAAC$_{t-1}$	MadjSize_ABN_OCF$_{t-1}$	MadjSize_ABN_PROD$_{t-1}$
MadjSize_ABN_TAAC$_{t-1}$	1		
MadjSize_ABN_OCF$_{t-1}$	-0.49***	1	
MadjSize_ABN_PROD$_{t-1}$	-0.05	-0.18*	1

Panel B. Correlation matrix for all MBO

MBOs (108)	MadjSize_ABN_TAAC$_{t-1}$	MadjSize_ABN_OCF$_{t-1}$	MadjSize_ABN_PROD$_{t-1}$
MadjSize_ABN_TAAC$_{t-1}$	1		
MadjSize_ABN_OCF$_{t-1}$	-0.53***	1	
MadjSize_ABN_PROD$_{t-1}$	-0.06	-0.18*	1

Panel C. Correlation matrix for all LBOs

LBOs (55)	MadjSize_ABN_TAAC$_{t-1}$	MadjSize_ABN_OCF$_{t-1}$	MadjSize_ABN_PROD$_{t-1}$
MadjSize_ABN_TAAC$_{t-1}$	1		
MadjSize_ABN_OCF$_{t-1}$	-0.42**	1	
MadjSize_ABN_PROD$_{t-1}$	-0.07	-0.18	1

Table 7: Asset Revaluation

The raw abnormal asset revaluation ($RAW\_ABN\_REVALUE_{t-1}$) in the manipulation year is measured as the change in asset revaluation reserves scaled by current total assets. We then subtract the industry average of the revaluation amount from the raw asset revaluation in order to obtain the industry mean-adjusted abnormal revaluation ($Madj\_ABN\_REVALUE_{t-1}$). Industry-size mean adjusted abnormal asset revaluation ($MadjSize\_ABN\_REVALUE_{t-1}$) is calculated by subtracting the mean asset revaluation of the control firms (falling in the same industry-size group) from the raw asset revaluation. ROA-matched asset revaluation ($ABN\_REVALUE_{t-1}$) is measured as the difference in asset revaluation between sample and control firms. The control firms are non-buyout companies with the same two-digit SIC code and the $ROA_{i,t}$ (considered in the same year as the sample firm) that is closest to the buyout target. In Panel B, "No change" signifies that the asset revaluation reserves remain the same in both the manipulation year and one year before. "Upward revaluation" indicates that there is an increase in revaluation activities from one year before the manipulation year to the next, while "Downward revaluation" captures the opposite case. "Transfer" reflects that the change in revaluation reserves are arising from transferring in or transferring out between revaluation reserves account and other reserves accounts. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.

Panel A. Abnormal revaluation

Abnormal revaluation	Total	MBO	LBO	Diff
$RAW\_ABN\_REVALUE_{t-1}$	0.001	-0.001	0.006**	-0.007**
$Madj\_ABN\_REVALUE_{t-1}$	0.002	-0.000	0.008**	-0.008*
$MadjSize\_ABN\_REVALUE_{t-1}$	0.004*	0.001	0.010*	-0.009
$ABN\_REVALUE_{t-1}$	0.005**	0.004	0.010*	-0.006
Nr. of observations	156	103	53	

Panel B. Detailed information on the asset revaluation reserves

Abnormal revaluation	Total	MBO	LBO
No change (%)	69.28	70.30	67.31
Upward revaluation (%)	20.26	3.96	5.77
Downward revaluation (%)	4.58	3.96	9.62
Transfer (%)	5.88	21.78	17.31
Nr. of observations	153	101	52

Table 8: Earnings manipulation by subperiod

This table assesses the impact of the enactment of the revised UK Coporate Governance Code of 2003 on the reduction of accounting manipulation. We divide the sample period into two subperiods: 1997-2003 and 2004-2007. Abnormal accruals, abnormal operation cash flows (OCF), abnormal production costs (PROD), abnormal assets revaluations are calculated similarly as in table 3, 4, 5 and 7, with variables lagged by two years. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level.

Panel A. Abnormal accruals

Abnormal accruals	Total	1997-	2004-	Diff
$RAW\_ABN\_TAAC_{t-1}$	-0.03**	-0.03***	-0.03***	0.00
$Madj\_ABN\_TAAC_{t-1}$	-0.12***	-0.14***	-0.04**	-0.11***
$MadjSize\_ABN\_TAAC_{t-1}$	-0.12***	-0.15***	-0.02	-0.14***
ABN_TAAC_{t-1}	-0.06***	-0.08***	-0.00	-0.07***
Nr. of observations	163	122	41	

Panel B. Abnormal operating cash flows

Abnormal operating CF	Total	1997-	2004-	Diff
$RAW\_ABN\_OCF_{t-1}$	0.03***	0.02**	0.04**	-0.02
$Madj\_ABN\_OCF_{t-1}$	0.02***	0.01**	0.03**	-0.02
$MadjSize\_ABN\_OCF_{t-1}$	0.02***	0.02**	0.03**	-0.02
ABN_OCF_{t-1}	0.02***	0.02**	0.01	0.01
Nr. of observations	163	122	41	

Panel C. Abnormal production costs

Abnormal production costs	Total	1997-	2004-	Diff
$RAW\_ABN\_PROD_{t-1}$	-0.06**	-0.02	-0.14**	-0.11**
$Madj\_ABN\_PROD_{t-1}$	-0.03*	-0.00	-0.10**	-0.09**
$MadjSize\_ABN\_PROD_{t-1}$	-0.03	-0.00	-0.09**	-0.08**
ABN_PROD_{t-1}	-0.06	-0.05	-0.05*	0.00
Nr. of observations	159	118	41	

Panel D. Abnormal revaluation

Abnormal revaluation	Total	1997-	2004-	Diff
$RAW\_ABN\_REVALUE_{t-1}$	0.001	-0.001***	0.007**	-0.008*
$Madj\_ABN\_REVALUE_{t-1}$	0.002	-0.001	0.011**	-0.012**
$MadjSize\_ABN\_REVALUE_{t-1}$	0.004*	-0.001	0.019**	-0.020**
$ABN\_REVALUE_{t-1}$	0.005**	0.003	0.014*	-0.013*
Nr. of observations	156	116	40	

Table 9: Analysis of the Incentives Affecting Earnings Manipulation (2SLS approach)

The first stage dependent variable is *Dum_MBO*, which indicates whether the buyout is a MBO (Dum_MBO=1) or a LBO (Dum_MBO=0). The IVs are *Management Own* (equity share owned by managers in pre-buyout target), *Non-Executive Own* (equity share held by non-executive directors) and *Size* (log. of total assets). The second stage dependent variable is *Industry-size mean adjusted abnormal accruals (MadjSize_ABN_TAAC$_{t-1}$) /operating cash flow (MadjSize_ABN_OCF$_{t-1}$) /production costs (MadjSize_ABN_PROD$_{t-1}$)*. *Pred_Dum_MBO*, is the predicted type of buyouts (from stage 1). *Dum_ External Financing* equals one when targets raise external funds during the buyouts. *SPPE* is the property, plant and equipment (*PPE*) scaled by total assets. For accrual management, the internal manipulation capacity is captured by the net operating assets (*NOA*) position (sum of equity minus cash and marketable securities, plus total debt, standardized by total sales). The level of the stock of inventories and receivables (*INVREC*) captures the flexibility of managers to manipulate real activities. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: First stage: The Buyout Type

Dep.Var. Dum_MBO	Model 1: First stage
Management Own $_{i, t-2}$	0.506***
	(0.189)
Non-Executive Own $_{i, t-2}$	-0.937***
	(0.356)
Size $_{i, t-2}$	-0.105***
	(0.029)
Year Fixed effects	Yes
Industry Fixed effects	Yes
Adjusted R^2	0.192
Tests of endogeneity (p value)	0.004
Test of overidentifying restrictions (p value)	0.255
Robust F	18.443

Panel B: Second stage: Determinants of earnings manipulation

	$MadjSize\_ABN\_TAAC_{t-1}$ (1)	$MadjSize\_ABN\_OCF_{t-1}$ (2)	$MadjSize\_ABN\_PROD_{t-1}$ (3)
$Pred\_Dum\_MBO_{i,t}$	-0.184**	0.090**	0.046
	(0.057)	(0.038)	(0.116)
$Dum\_External\ Financing_{i,t}$	0.062	0.048	-0.053
	(0.062)	(0.042)	(0.121)
$SPPE_{i,t-2}$	0.031	0.111**	0.152
	(0.061)	(0.042)	(0.131)
$Dum\_External\ Financing_{i,t} * SPPE_{i,t-2}$	-0.096	-0.093	-0.069
	(0.098)	(0.068)	(0.176)
$MTB_{i,t-2}$	0.012	-0.005	-0.018
	(0.008)	(0.005)	(0.017)
$NOA_{i,t-2}$	0.050		
	(0.061)		
$INVREC_{i,t-2}$		-0.076*	0.114
		(0.045)	(0.148)
Constant	-0.073	-0.041	-0.153
	(0.124)	(0.077)	(0.219)
Year Fixed effects	Yes	Yes	Yes
Industry Fixed effect	Yes	Yes	Yes
Observations	158	158	156

Table 10: Robustness tests on the determinants of earnings manipulation

This table provides the robustness tests for second stage regressions of Panel B, Table 9. The dependent variable in Model (1) is *ROA matched abnormal accruals* (*ABN_TAAC$_{t-1}$*). The dependent variable in Model (2) is *raw adjusted abnormal operating cash flows* (*RAW_ABN_OCF$_{t-1}$*). For definitions of the other dependent and independent variables, see Table 1. Model (4) conducts the second stage by means of a GMM approach. Models (5) and (6) further investigate the change in accrual management behavior after the enactment of the revised UK Corporate Governance Code (*Code*) in 2003. The first stage IVs are *Management Own*, *Non-Executive Own* and *Size*. *Pred_Dum_MBO*, is the predicted type of buyouts. YearCode equals one if the buyout took place after 2003, zero otherwise. The other variables are the same as in Table 9. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level.

Second stage: Incentives affecting accounting manipulation discretion

	ABN_TAAC$_{t-1}$ (1)	RAW_ABN_OCF$_{t-1}$ (2)	MadjSize_ ABN_TAAC$_{t-1}$ (Probit) (3)	MadjSize_ ABN_TAAC$_{t-1}$ (GMM) (4)	MadjSize_ ABN_TAAC$_{t-1}$ (Code) (5)	MadjSize_ ABN_OCF$_{t-1}$ (Code) (6)
Pred_Dum_MBO$_{i, t-2}$	-0.151**	0.077**	-0.134**	-0.186***	-0.245**	0.118**
	(0.054)	(0.036)	(0.050)	(0.057)	(0.080)	(0.051)
YearCode					-0.075	0.104*
					(0.081)	(0.058)
Pred_Dum_MBO$_{i, t-2}$					0.241**	-0.111**
*YearCode					(0.087)	(0.056)
Dum_External	-0.013	0.057	0.060	0.041	0.058	0.051
Financing$_{i, t}$	(0.074)	(0.041)	(0.063)	(0.061)	(0.064)	(0.041)
	0.044	0.109**	0.040	0.017	0.070	0.091**
	(0.075)	(0.043)	(0.062)	(0.059)	(0.069)	(0.037)
Dum_External	-0.053	-0.106	-0.111	-0.062	-0.107	-0.090
Financing$_{i,t}$ *SPPE$_{i, t-2}$	(0.114)	(0.067)	(0.101)	(0.095)	(0.100)	(0.064)
NOA $_{i, t-2}$	-0.063		0.068	0.0412	0.0405	
	(0.077)		(0.063)	(0.061)	(0.060)	
INVREC $_{i, t-2}$		-0.069				-0.061
		(0.042)				(0.045)
Constants	0.092	-0.035	-0.124	0.006	0.055	-0.055
	(0.147)	(0.072)	(0.127)	(0.009)	(0.132)	(0.079)
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	158	158	158	158	158	158

Chapter 2

Private Equity Firms in Private Buyouts

Abstract

We study the role of private equity firms in a sample of UK private buyouts that took place between 2003 and 2008. Private buyouts are those that involve private companies. We first analyze what determines a deal to be backed by a private equity firm. We find that several reasons motivate this choice, both at industry level (product market competition, industry dynamism) and at company level (growth and profitability). We then turn to the outcomes of private equity backed deals, comparing them to those financed by banks. We document that private equity firms back deals that grow faster, invest more, take on more debt, and are less profitable in the short-run. Overall, these results point to private equity firms being important for the success of private buyouts.

1. Introduction

Private equity (PE) firms are important financial intermediaries whose role has been shown to be important both in selecting companies that need specialized investments and in bringing them to realize their growth and profitability potential. Several studies document such a role of PE firms. In the context of venture capital, research has shown that PE investors select promising companies, help them refine their strategy, build a management team, and quickly grow in order to be acquired or listed on the stock market (see Da Rin, Hellmann, and Puri (2013) for a survey). In the context of buyouts, several studies have examined "public-to-private" leveraged buyouts (LBOs) of listed companies; they show that PE firms can create value by taking public companies private, restructuring them, and improving their corporate governance (see Kaplan and Strömberg (2009) for a survey).

In this paper we extend this literature by studying the role of PE firms in private buyouts. These are transactions where private companies, whose owners intend to sell their stake or need capital for investment, find a buyer and an investor that provides the financing for the transaction; an investor is typically needed because the buyer, often the company's top management, lacks the financial resources to finance the purchase. As we document below, these deals are smaller than public-to-private transactions and therefore need much less financing. This makes it possible for the buyer to rely fully on bank financing. However, the investor may also be a specialized investor, i.e., a PE firm which buys the firm from its current owners and will later sell it to the current managers, or to a new managerial team. The

economic rationale of private buyouts may therefore be quite distinct from that of LBOs, as private companies have concentrated ownership structure (Bodnaruk et al. (2008)) and typically have owners-managers; therefore these companies are less exposed to agency problems than public ones. We ask what type of company is more likely to engage in PE-backed or bank-backed deals.[1]

Private buyouts are economically relevant transactions. Strömberg (2008) reports 10,018 private buyouts worldwide undertaken from 1970 to 2007, which account for 46.8% of all buyouts; this compares to 1,399 LBOs, which accounted for 6.7% of the total buyouts deals. In terms of deal value, LBOs, which are larger transactions, amount to USD 1.1tn, or 28.2% of the total transactions volume; still, private buyouts amount to USD 0.85tn, which represents 21.8% of total deal value. Yet, the literature on private buyouts is very thin, as data on private companies are largely unavailable. Two papers are closely related to ours. Boucly, Sraer, and Thesmar (2011) study a sample of French companies undergoing LBOs, divisional buyouts, and also private buyouts. They compare companies undergoing a private buyout to a matched sample of non-buyout companies (not necessarily private), and find that the former invest more, increase their sales, and become more profitable. This evidence suggests that private buyouts may be beneficial to companies by reducing financing constraints, though the results cannot be considered causal because the choice of undergoing a buyout is unlikely to be random, and only partially captured by the observable variables on which matching is based. Acharya et al. (2013) study a sample of large LBOs executed by large PE firms in Western Europe, and document the value creation in terms of accounting performance. Neither paper looks into the determinants of private buyouts, as they only look at what happens after the deal.

Our first, and main, contribution is to ask what determines private buyouts to be backed by PE firms. Second, we document how these deals fare in the aftermath. It is important to notice that we are looking at companies that have chosen to undergo a buyout. Our research question is whether the choice of intermediary responds to an economic rationale and can be understood on the basis of firm or market characteristics. When we look at the determinants of this choice, therefore, we are already controlling for the determinants of the choice to undertake a buyout in the first place, and focus on whether a specialized intermediary is

[1] See Fang, Ivashina and Lerner (2013) for the role of banks in leveraged buyouts in the US market.

chosen. When we look at company evolution after the deal, we look at companies that are observationally very similar, as they already chose to undergo a buyout. However, to the extent that the choice of being backed by a PE firm is not random, we need to be cautious in interpreting the results, and cannot interpret them as in a causal way. We would also like to disentangle the residual difference between selection and treatment effects of PE backing, and this is currently our main 'to do' item.

Our empirical strategy allows us to study how private equity backed buyouts create value beyond the lifting of financial restrictions and improving monitoring post-deal that is typical of bank-financed private buyouts. Building on the literatures on venture capital and LBOs, we argue that PE firms select (and, in turn, are chosen by) companies that have distinctive characteristics. We also argue that PE firms can provide specific contribution also in the case of private buyouts. In particular, their knowledge of the marketplace is likely to guide their investments towards companies with strong growth potential and operating in dynamic industries. We are currently exploring the channels through which PE firms add value to their companies.

Data on private equity transactions are generally unavailable, except for LBOs that involve public companies, or difficult to come by. From several sources, we collect data on private buyouts in the UK from 2003 to 2008. The UK constitutes an excellent economy to look at from our perspective, for at least two reasons. First, it has a large and well established private equity industry, which is the second largest in the world, after the US. This ensures that the operations of PE firms reflect consolidate practices and are not driven by transient factors or by learning best practices. Second, accounting regulations require British private companies to file audited accounts with a central authority, which makes the information publicly available. At the same time, to the best of our knowledge, there are no regulations that hinder the ability of PE firms to invest in companies in the mid-market for buyouts. Since we want to study both the determinants and effects of private buyouts, we choose to limit our sample in time so that we can obtain accounting data (i) for two years before the transaction year, and (ii) for at least one year (and up to three) after the transaction year. We choose the 2003-2008 period in order to obtain reliable data both before and after the deal, as we explain more in detail below.

The paper makes three main contributions to the literature. First, it provides evidence on economically important private buyouts, on which there is very little research. Second, unlike the few studies on this topic, which focus on the consequences of buyouts, we look at both causes and consequences of private buyouts, which provide a deeper comprehension of their economics. And third, we document that PE firms are associated with private companies that overcome credit constraints, invest, and grow more than companies relying on other financing sources for their buyouts.

We first explore what characteristics make a deal more likely to be backed by a PE firm rather than by a bank. We consider four motivations for this choice, at both industry-level and firm-level. First, we consider an industry-level factor that may influence the decision to undergo a private buyout: companies are not isolated in their product market. Akdoğu and MacKey (2008) provide evidence on an inverted-U shaped relationship between competition and investment. Building on their results, we conjecture that in monopolistic industries, the threat of PE investments is low, because incumbents would be little influenced by new small-sized rivals. Similarly, in competitive markets, no single PE-backed company would yield enough market power to threaten incumbents. However, in intermediate competition market settings, the financial and operational skills brought by PE firms may make a difference in creating market power, and justify an increase in the investment made by the company.[2] Unlike other financiers, PE firms make their profits from capital gains, so they are particularly eager to invest in companies that can achieve market power. Therefore, we conjecture that the potential benefits of undergoing a PE-backed deal depend on the degree of product market competition.

We then look at three firm-level sets of determinants. First, we build on Boucly, Srarer, and Thesmar (2011), who argue that private buyouts may be sought for by financially constrained companies. We bring this logic to the next stage, that of choice of buyout intermediary, and conjecture that PE firms may help reducing financial constraints. Saunders and Steffen (2011) find that private companies face higher borrowing costs in loan markets than public companies. PE investors could mitigate the financial limitation of buyout companies by injecting equity capital as well as increasing debt capacity. Ivashina and Kovner (2012) also

[2] Consistent with this conjecture, Hsu, Reed, and Rocholl (2012) show that PE-backed LBOs bring about competitive effects; in particular, an LBO weakens the performance of the company's rivals.

find that PE-backed LBO companies borrow on more favorable terms.

Second, we reckon that private companies are usually tightly controlled, and their founders typically hold large stake.[3] Such ownership concentration means that controlling shareholders are not well diversified, since they have much of their wealth invested in the companies they control. Bodnaruk et al. (2008) document that diversification is an important determinant of the decision to take a private company public. PE-backed buyouts may offer an attractive alternative to listing for private companies that are not able, or willing, to do so.

Third, agency problems may occur also in private companies whenever the interests of managers and shareholders are not perfectly aligned. Regardless of whether agency problem arise from the "empire building" postulated by Jensen (1989), where managers use free cash-flow to invest in value-destroying projects, or from the "quiet life" first posited by Hicks (1965), where managers will buy peace with employees and avoid cognitively difficult activities, they will lead to the same outcome: inefficiency and poor performance (Bertrand and Mullainathan (2003)). As for LBOs, PE firms specialize in operational and governance improvements (Kaplan and Strömberg (2009)) and provide private companies with a resolution of agency problems.

Our evidence is that both industry-level and firm-level variables contribute to explaining why some deals are PE-backed. These deals involve faster-growing, more profitable companies than other deals. Notice that this does not imply that factors like access to credit or the resolution of agency conflicts are irrelevant for private buyouts. It rather means that they are not relevant for the type of buyout sponsor[4]. We find that industry factors matter as well. PE-backed deals tend to be in fast growing industries. Product market competition is also important, with PE firms investing more in companies that operate in concentrated industries; we do not find a U-shaped effect, as industry concentration affects the likelihood of a deal being PE-backed linearly.

The second part of the paper turns to the performance of private buyouts. We find that PE-

[3] Holderness (2001) shows that 96% of the firms in the US have a block-holder. Faccio and Lang (2002) report that 86% of the UK firms have ultimate controlling shareholders.
[4] In the industry jargon, sponsor is the intermediary that finances the deal.

backed companies grow faster than other ones, invest more, and also increase their leverage. This confirms the results of Boucly, Sraer, and Thesmar (2011) and extends them by using a complementary methodological approach. In particular, our results show that not all private buyouts are equal, and that the nature of the intermediary is very important.

We are currently bringing this analysis further in three main directions. First we are looking at separating selection and treatment effects, so as to deliver a cleaner causal interpretation of the effects of PE-backing. Second, we are looking into the channels through which PE-backed private buyouts achieve stronger growth. Performance improvements stem from two sources: one is the expected value creation due to PE financing, taking the company in isolation, the other results from the post-deal gains in competitive standing. We are going to measure to what extent the performance of PE-backed buyouts takes advantage of such competitive effects, looking at whether product market competition affects post-deal performance. We will also look into whether any firm characteristics also affect performance. These analyses will help us understand how the realized outcome of buyouts squares with their determinants. Third, we are looking into PE firms to see how their capabilities may affect deal outcomes: in particular, how do PE firms with different partner experience fare?

The remainder of the paper is organized as follows. In the next section, we develop the main hypotheses for the empirical tests. Section 3 describes our data sources and sample selection procedure, and defines the variables. Empirical results are provided in Section 4. Section 5 briefly concludes.

2. Hypotheses

2.1. Hypotheses

The first research question of this paper is the decision of which intermediary, bank or PE firm, will back a private buyout. We distinguish between determinants of this choice that are firm-specific and industry-specific; these are determinants that are likely to influence the decision to undergo a buyout in the first place, but are also likely to carry over to the next step, the choice of intermediary. The industry-level explanation is based on "Product market competition," as the size of potential value created through a buyout depends on the intensity of product market competition. We then look at three firm-level explanations for the choice of intermediary in private buyouts: "Financing constraints," "Ownership diversification," and

"Agency problems."

2.1.1 Industry-level determinants

Product market competition

Companies do not operate in isolation, but compete with product market rivals. In theory, PE investments may affect the optimal operating strategies of targets' rivals. In empirical research, Hsu, Reed, and Rocholl (2012) find that companies receiving PE investments outperform their competitors. Rivals experience a decline in operating performance after PE investments, while targets increase their profitability. If the level of product market competition affects managers' operating decisions, it will also influence the size of potential benefits of PE investments, and the likelihood of PE investments in the first place. Akdoğu and MacKey (2008) present evidence on an inverted U-shaped association between competition and investments. They argue that the benefits of investing are low in monopolistic industries, where incumbents have various devices to soften the competition. The benefits are also not prominent in competitive industries where no single company holds enough sway to threaten other industry participants. Following the same logic, we argue that an inverted U shape relationship should be found in the context of PE investments. The value of PE investments is larger between the two extremes, where companies neither have enough or little market power to ignore or to be ignored by the influence exercised by PE investors. Hence:

Hypothesis 1: The benefits of PE investments increase with the level of product market competition but decrease after competition has reached a certain threshold.

2.1.2 Firm-level determinants

Financing constraints

Boucly Sraer, and Thesmar (2011) provide evidence that private buyouts help private buyout companies alleviate their credit constraints and thus achieve faster growth. The economic logic is as follows: Saunders and Steffen (2011) find that UK private companies confront a noticeable loan cost disadvantage: they pay on average 27 basis points more on loan spreads as compared with publicly held firms, which translates into $0.64 million extra annual interest costs. As a result, private companies may forgo investment opportunities due to their limited access to credit markets. The disadvantage of being private is largely caused by the

higher costs of information production. However, information uncertainty can be reduced by certification by a PE investor. Moreover, PE investors inject fresh capital in buyout companies and can facilitate borrowings by using their network. Ivashina and Kovner (2012) show that PE-backed LBO companies obtain loans with lower spread and favorable terms. In addition, PE firms possess operational skills that allow them to identify and manage good investment opportunities (Acharya et al. (2013). In so doing, financial buyers of private targets will ease the investment constraints of targets and capitalize their growth opportunities. Hence:

Hypothesis 2: Companies with financial dependence are more likely to be targeted by PE investors than by banks.

Ownership diversification

Ownership structure affects the ability of owners to influence corporate risk-taking strategies. Faccio and Lang (2002) find that 86% of UK firms have an ultimate controlling shareholder. Bodnaruk et al. (2008) show that over a quarter of Swedish private firms have just one controlling shareholder and 80% have four or less. Shareholders who invest much of their wealth in a single firm have large exposure to idiosyncratic firm risk and thus choose less risky investment behavior. They may therefore conduct business in a more risk-averse fashion than if they had a diversified portfolio. They take both nonsystematic and systematic risks into account when making operational decisions, in comparison with a fully diversified shareholder who cares about only systematic risks (Faccio, Marchica, and Mura (2011)). Hence, they may be inclined to undertake conservative investments, even to the extent of passing up value-enhancing risky projects. Bodnaruk et al. (2008) find that the risk diversification consideration of less diversified shareholders is a key cause of the timing and occurrence of IPOs. Buyouts provide an exit route for large shareholders. New large shareholders like PE firms are diversified and therefore relatively risk tolerant, and thereby willing to take on risky projects. So, private companies with a concentrated shareholding structure are more likely to be backed by PE investors. Hence:

Hypothesis 3: Companies with large shareholders are more likely to be targeted by PE investors than by banks.

Agency problems

In public-to-private LBOs, agency problems are at the heart of the going private decisions. Acharya et al (2013), and Wright, Hoskisson, and Busenitze (2001), among many others, describe that a prominent value gains in LBOs stem from the reduction of agency costs, as active investors can improve the incentive alignment between managers and shareholders post-buyout. One type of agency problem is called "empire building." This occurs when managers with high free cash-flow available tend to overinvest, even to the extent of initiating value-destroying projects to maximize their own benefits rather than maximizing shareholder value. A second type of agency problem is referred to as "quiet life." This occurs when managers seek to avoid cognitively difficult activities and to buy peaceful relations with employees and suppliers, thereby slowing down investments. Both issues result in low efficiency and profitability (Bertrand and Mullainathan (2003)). In the context of private buyouts, even if the ownership structure is concentrated, agency problems are likely to still exist since incentives are not perfectly aligned; this is likely to be the case as conflicts of interest are not only between managers and shareholders, but also between majority and minority shareholders (Pagano and Roell (1998)). Kaplan and Strömberg (2009) point out that in line with Jensen's (1989) argument, PE firms specialize in financial, governance, and operational engineering. In so doing, they improve portfolio companies' operational efficiency and create economic value. Therefore, PE investors are interested in targeting these companies to remove inefficiencies. Hence:

Hypothesis 4: Companies with low productivity are more likely to be targeted by PE investors than by banks.

2.2. Empirical strategy

To analyze the determinants of PE investments, we look at companies that do undergo a private buyout and analyze the choice between private equity firms and banks. This design helps filtering out the unobservable factors which may drive the occurrence of private buyouts and allows testing the observable forces which attract PE investments. We start with the three firm-level motives for the potential value added by PE firms. We then add the product market competition variable to test that additional motivation. Size effect, factors that affect the availability of debt financing one-digit 10 Fama-French industry dummies, and year dummies are also included.

Model 1: Firm-level explanations

$$Logit(PE_{it}) = F(\alpha_1 + \alpha_3 CreditConstra\,\text{int}\,s_{it} + +\alpha_4 OwnDiversif_{it} + \alpha_5 Agencyproblems_{it} + Controls_{it} + YearFE + IndutryFE) \quad (1)$$

Model 2: Strategic benefits of PE backing

$$Logit(PE_{it}) = F(\alpha_1 + \alpha_2 HHI_{it} + \alpha_3 CreditConstra\,\text{int}\,s_{it} + \alpha_4 OwnDiversif_{it} + \alpha_5 Agencyproblems_{it} + Controls_{it} + YearFE + IndutryFE) \quad (2)$$

To evaluate the effects of PE investments on private buyouts, we perform the following regression in the spirit of Boucly, Sraer, and Thesmar (2011):

Model 3: Outcomes of PE investments

$$Y_{it} = \alpha_i + \delta_t + \beta_1 POST_{it} + \beta_2 POST_{it} * PE_i + \varepsilon_{it} \quad (3)$$

Where *i* denotes companies, and t denotes time (year). Y_{it} represents the performance variable, in terms of growth, investments, leverage and profitability. α_i and β_t are a company-specific and time-specific fixed effect, respectively. $POST_{it}$ equals 1 for years after the buyout and 0 for years before the buyout. PE_i equals 1 if the buyout is backed by PE firms and 0 if it is backed by banks

As a robustness check, we also employ the methodology of Pagano, Panetta and Zingales (1998) to assess the post-deal performance of PE-backed investments. With this approach we evaluate the yearly impact of PE investments, as opposed to its total effect over the three post-buyout years. The advantage is to better measure changes in each year, at the cost of potentially losing statistical power for the overall effect.

Model 4: The effects of PE investments: alternative model

$$Y_{it} = \alpha_i + \delta_t + \sum_{j=1}^{3} \beta_j POST_{i,t-j} + \sum_{j=1}^{3} \gamma_j POST_{i,t-j} * PE_i + \varepsilon_{it} \quad (4)$$

Notation is as before, except that now $POST_{i,t-j}$ equals 1 if year t-j is the buyout year and 0 otherwise.

3. Data and variables

3.1. Data sources and sample construction

To investigate the determinants of PE-backed private buyouts at company level, we build a unique dataset using four source databases: (i) Zephyr; (ii) SDC; (iii) Amadeus; and (iv) Fame. All are published by Bureau van Dijk, except for SDC, which is published by Thomson-Reuters. Buyout transactions are retrieved from Zephyr and SDC. While the former has a better coverage of small deals, especially in Europe, the latter targets relatively large transactions. By combining them together, we obtain both cross-validation and complementary information, and therefore a comprehensive picture of UK private buyouts. Amadeus provides general company information and financial data on UK private companies based on annual reports filed to the Company House. Cash-flow statements and ownership information are obtained from Fame, which is based on annual returns reported to the Company House. For the companies with incomplete accounting information in Amadeus and Fame, we obtain the information directly from the Company House.

We identify all private-to-private buyouts from SDC with the following criteria: (i) Transactions are announced between January 2003 and December 2008; (ii) The acquisition techniques are classified as leveraged buyout, management buyout, management buy-in, or institutional-led buyout; (iii) At least 50% of ownership stake is acquired in the transaction; (iv) The transaction is completed; (v) The target nation is UK; (vi) The target is a private company or a subsidiary; (vii) The target is not located in primary industries, utility industries, or financial services.[5] After applying these filters, we obtain 1,680 deals. We also retrieve private buyouts from Zephyr with the same criteria, with one additional constraint: we exclude transactions whose sub-deal types are: exit, public takeover, recommended bid, public takeover, tender offer. We end up with 1,684 transactions.

We then match private buyouts from both databases according to information on company name, industry, and zip code. Transactions that are in both datasets are counted once; transactions without records in Amadeus are dropped. This yields 1,872 observations. We obtain deal information on these transactions from SDC and Zephyr, and complement it with news releases from Capital IQ, Factiva, Google, and company websites and annual report.

[5] Companies operating in healthcare or education are also dropped, as these industries are highly regulated in Europe (Klapper, Laeven, and Rajan (2006)).

The exclusion of financial distressed buyouts (107),[6] buy-and-build buyouts (60), secondary buyouts (175) and problematic buyouts, e.g., employee buyouts, (15), reduces the sample to 1,515 delas. These deals are dropped because they are distinct from normal buyouts and thus subject to different buyout motives. Out of these 1,515 transactions, 694 are divisional buyouts, and 821 are independent private buyouts. We discard divisional buyouts since they either involve public companies, or do not have pre-deal financial information.

Accounting information on the 821 independent private buyouts is obtained from Amadeus or the Company House. We lose 54 observations that are without balance sheet accounts. This may arise from the fact that some young and small companies are bought out before they are required to publish their accounts. An additional 369 companies are dropped as their sales accounts are unavailable because they are not mandatory to be reported.[7] Moreover, medium-sized companies are allowed to provide an abbreviated profit and loss account, which does not need to disclose sales. The loss of observations due to these regulations may lead to a larger average company size in our sample, than it is in the whole population.

To further ensure the reliability of the accounts information, we delete 40 companies with less than £1 million in sales, as these companies are exempt from external auditing.[8] We obtain 358 transactions that contain the necessary accounting information to construct all the proxies we employ in the analysis. We drop 26 observations due to missing data on competition and other industry-level proxies. We drop another 66 observations due to missing information on sales before the buyout, and 44 observations are left due to the unavailability of ownership information. The final sample comprises 222 independent private buyouts. All variables are winsorized at the 5% level. Out of the 222 buyouts, 54.0% (120) are financed by

[6] We classify deals as financially distressed buyouts if: the target company (i) is recorded as in administration, dormant, or in liquidation in either database; or (ii) is classified as being in receivership in Zephyr; or (iii) is coded as being in bankruptcy in SDC; or (iv) is coded as a bankruptcy purchase in Capital IQ; or (v) is mentioned as financial distressed buyout in news releases.

[7] Under Part 7 of the Company Act 1985, small companies are required to report only abbreviated balance sheet statements. Small-sized companies are defined as companies that meet all of these three criteria: (i) total assets below £1.4 million; (ii) operating revenues below £2.8 million; (iii) average number of employees not exceeding 50 for the last 2 years. As the number of employees is very incomplete in Amadeus, We follow Brav (2009) and use a selection rule based on total assets and operating revenues before the buyout.

[8] Boucly Sraer, and Thesmar (2011) express the concern that small private held companies in their French sample may have the incentives to underreport their earnings in order to avoid paying corporate income tax. They argue that for companies above a certain size underreporting is not a major issue. Since it is extremely difficult to empirically rule out earnings manipulations, restricting the analysis to companies with audited accounts helps assuage concerns about accounting quality.

PE firms, the rest by banks.[9]

We choose the year 2003 as the starting year and 2008 as the ending year for two reasons. First, after the crash of stock and credit markets in 2000 and 2001, the private equity market recovered by 2003; it then fell abruptly with the financial crisis in 2008. The 2003-2008 period thus represents a full buyout wave. Equally important, the coverage for private companies in Amadeus and Fame has improved dramatically since 2001. Because we require two years of accounting information preceding the transactions, 2003 represents a good starting year for our sample. Moreover, Strömberg (2007) points out that there were some onerous corporate governance regulations imposed in 2001-2002, further justifying our choice. We choose 2008 as the end period in order to be able to obtain post-deal accounting data.

3.2. Variables

In this subsection, we describe all the variables we use in the empirical test. Table 1 provides definitions and summarizes the sources of information.

3.2.1 Dependent variables

We first look at dependent variables. When we look at the determinants of deals being PE-backed, we employ a dummy variable which equals 1 if the buyout is backed by a PE investor, and 0 if it is financed by a bank (PE).

When we look at the outcomes of private buyouts, we use a set of variables that summarize a company's performance. We measure corporate growth by sales and by the number of employees. Each is measured in each year between two years before the buyout and three years after the buyout. Log($SALES_t$) is the logarithm of sales, and Log($EMPLOYEES_t$) is the logarithm of number of employees, measured in years relative to the deal: t=-2,-1,+1,+2,+3. We then measure investment policy with the logarithm of total assets (Log($ASSETS_t$)) and of fixed tangible assets (Log($FIX\_TAN\_ASSETS_t$)), where t has the same range as above. For leverage ($LEVERAGE_t$) we use total debt divided by total assets. Finally, for profitability we use both operating profitability, the ratio of operating income to sales ($PROFITMARGIN_t$), and net profitability, the net income divided by sales, ROS_t.

[9] Only 4 of these 222 deals involve two PE firms, so do not need to address issues of disentangling the role of different PE firms.

3.2.2 Independent variables

We now turn to the independent variables. First, we look at industry-level variables. To test the importance of product market structure, we use the Herfindahl-Hirschman Index (HHI) to proxy for product market competition. HHI is a standard proxy in industrial organization theory (Tirole (1988)), widely adopted in finance empirical research (Hou and Robinson (2006), Akdoğu and MacKey (2008), Giroud and Muller (2010), Valta, (2011)). [10] HHI_ASSETS is defined as:

$$HHI_{jt} = \sum_{i=1}^{N_j} s_{jt}^2$$

where S_{ijt} is the market share of firm i in industry j in year t. Market shares are measured from Amadeus based on firms' total yearly assets at two-digit NACE industry code level (Aghion et al., (2005), Bloom and Van Reenen (2007), Boucly Srarer, and Thesmar, (2011)).[11] We compute HHI based on total assets because for private companies total assets are less easily manipulated than total sales, which are another common choice for HHI calculation. Moreover, all firms are required to report assets, while smaller companies may choose whether or not to report total sales.

Amadeus covers both public and private companies, which helps in obtaining the entire distribution of time-varying market share within each industry. We compute industry concentration including both public and private companies, with the exclusion of unlimited companies, guarantee trusts, partnerships, investment trusts, and unclassified companies. We further discard companies in "miscellaneous" industries, as these companies are more likely to be unclassified and hence not compete in the same product market (Clarke (1989), Hoberg and Phillips (2010)).[12] We compute two measures of HHI built on two different sets of companies. The first set consists of the whole sample of companies available in Amadeus. The second set is made up of the subset of companies reporting consolidated financial statements, so as to avoid double counting issues..

[10] Industry concentration is a natural consequence of the three main determinants of the nature of competition: (i) entry barriers, (ii) product substitutability, (iii) market size (Raith (2003)).

[11] For multi-segment companies, a more precise way to compute HHI would be to use firm segment data. Because this information is not available through Amadeus, We follow Aghion et al. (2005), Hou and Robinson (2006), and Giroud and Muller (2010) by classifying firms according to their NACE classification primary code, where the firm had the largest proportion of its sales.

[12] We identify "miscellaneous" industries in NACE Rev. 1.1 as industries whose description ends with 'not everywhere classified.'

Second, we construct three sets of variables to explain the company-level motives for potential gains from PE investments: financing constraints, ownership diversification, and agency costs. For the financing constraints motive, we measure the degree of financial constraints (or dependence) in the spirit of Rajan and Zingales (1998). Financial dependence (FIN_DEP) is computed as the difference between investment (measured as change in gross fixed assets) and gross cash flows, normalized by investment (see also Boucly, Sraer, and Thesmar (2011)). The industry median value of this ratio indicates the industry's need for external financing. We complement this measure by a dummy variable indicating whether or not a company paid a dividend (DIVIDEND), as in Bharath and Dittmar (2010). We expect that companies in financial dependent industries, or which are non-dividend-payers to be more likely to receive funding from PE investors. As the benefits for receiving PE funding are higher for companies with strong investment opportunities, we measure current investment as capital expenditure in property, plant and equipment (CAPEX). As a proxy for future investment opportunities, we use both the median ratio of industry growth rate (INDUSTRY_GROWTH)) and company growth rate (GR(SALES)) (Pagano, Panetta, Zingales (1998), Bodnaruk et al. (2008), Bharath and Dittmar (2010)). We also employ a dummy variable to identify financially constrained companies with high growth. This dummy variable equals one when the age of the target is below the median value of the sample but the size of the target is above the median value (GAZELLE).

With respect to the ownership diversification motive, we measure ownership as the percentage equity stake of the largest shareholder in the company one year before the buyout (OWNERSHIP), following John, Litov, and Yeung (2008) and Paligorova (2010). The prediction here is that shareholders with substantial equity ownership are more inclined to diversify through a buyout. This creates an opportunity for PE investors' equity injection and for the introduction of potentially value-enhancing riskier projects.

For the agency costs reduction motive, productivity (PROD_SALES) is measured as sales per employee (labor productivity), following Maksimovic and Phillips (2008) and Giroud and Muller (2011). Regardless of whether the agency problem is caused by empire building or by rent seeking, we expect PE investors to back less inefficient companies in the hope to generate value by removing inefficiency and improving economic performance.

We then add a number of control variables. First, we control for information on bank financing and use the following variables derived from the financing costs literature (see Rajan and Zingales (1995), Frank and Goyal (2004), Faulkender and Petersen (2006), Brav (2009), and Saunders and Steffen (2011)). (i) Tangibility. Tangible assets provide collateral in case of financial distress and are thus expected to be positively related to the willingness of bank financing in private buyouts. Tangibility (TANGIBILITY) is measured as tangible fixed assets scaled by total assets. (ii) leverage (LEVERAGE) is measured as total debt divided by total asset one year before the buyout. (iii) Profitability. According to pecking order theory, companies raising equity should be the least profitable companies. So compared with PE-backed buyouts, bank-financed buyouts are expected to be more profitable. It is also consistent with the agency costs reduction motive, where low profitability may proxy for inefficiency. EBITDA over sales (PROFIT) is our proxy for profitability. (iv) Cash holdings (CASH) are measured as cash plus cash equivalent divided by total assets, one year before the buyout. In comparison to PE firms, banks are expected to select target companies with lower downside risk and lower default risk, and with relatively higher profitability and asset tangibility. Finally, as in Boucly, Srarer, and Thesmar (2011), in the regressions we use the dummy variable POST that is equal to 1 for years after the buyout, and 0 for years before the buyout.

Finally, we include year fixed effects and one-digit industry fixed effects. These fixed effects help control for industry or secular shock that might impact on PE investments.

4. Results

4.1. Univariate evidence

We start by looking at some univariate results from Table 4, which compares means of all dependent variables for the two subsamples of PE-backed and other (bank-financed) buyouts. This table shows that the two sub-samples are markedly different. PE-backed companies are in more concentrated and faster growing industries; they more profitable and pay dividends more often; they also grow faster. PE-backed companies are also more likely to be ‘gazelles’, firms that have reached a large size in a short period of time. They invest more, and have dominant shareholders who hold smaller equity stakes. Interestingly, we notice that there is no difference in financial dependence across the two groups of companies: while overcoming

borrowing constraints may well be a rationale for private buyouts, there does not appear to be any difference in this according to the two types of buyout sponsors.

These differences suggest that both industry and company-level variables may affect which type of intermediary backs a particular company, as we are going to explore more formally in the following sections.

4.2. Which private buyouts are private equity backed?

4.2.1 Main results

We now turn to the multivariate analysis. We report the main results in Table 5. Models 1 and 2 consitute our base models that look into company-level motives for deals being backed by a private equity firm. The estimated coefficients on these determinants (productivity, financial dependence, and ownership concentration) are all insignificant. This implies that except for sales growth rate, there is no significant difference in the firm-level motives between PE-backed and bank-financed deals. Therefore, while in the decision to undertake a buyout, financial dependence has been shown, not surprisingly, to be an important determinant (Boucly, Sraer, and Thesmar (2011)), this motive vanishes when it comes to the nature of the intermediary that backs the buyout. Moreover, PE firms finance more profitable companies that operate in faster growing industries and have reached large size in a short period (the 'gazelles').

The next column, Model 3, present the effect of the "product market motive," controlling for company-level determinants. The findings from the two previous models remain unchanged. Moreover, we find a strong and significant relationship between product market competition and PE firm backing of the deal.[13] This is a novel and interesting result in the literature, which points to PE firms selecting companies in fairly concentrated, yet fast-growing, industries. The effect of HHI is economically large. When HHI_ASSETS increases from the 10th to 90th percentile, the probability of the deal being backed by a PE investor increases from 44.25% to 69.21%. Since the probability of PE backing is 55.53% at the sample means of all variables, the increase in probability is about 45%. To see it differently, a one standard deviation increase in HHI_ASSETS increases the probability of PE backing by 12.00%, which corresponds to a 21.59% increase on the baseline probability. We conclude that

[13] In unreported regressions, we find that a quadratic term is negative (as expected) but not statistically significant.

product market competition is a very important factor for determining which investor will back a private buyout.

Another important significant determinant of PE firm backing is SALES(GROWTH). This variable has an economically significant effect: one standard deviation increase in SALE(GROWTH) increases the probability of PE backing by 12.83%, which corresponds to a 23.07% increase on the baseline probability. PROFIT also has a significant impact on the probability of PE backing, which turns out to have a sizeable magnitude: one standard deviation increase in PROFIT increases the probability of PE backing by 17.42%, which corresponds to a 31.38% increase on the baseline probability. Finally, the GAZELLE variable, which identifies companies that have grown fast over a short period of time, increases the probability of PE backing by 18.10%.

4.2.2 Robustness of the results

In Tables 6 and 7 we explore several robustness checks for our results. In Table 6 we further explore the importance of product market structure. For this, we employ a variety of alternative measures of concentration. First, in Model 1 we measure concentration in a coarser but starker way, to verify whether any distributional characteristic may drive our result. For this, we use a dummy variable that equals 1 if industry concentration is above the sample mean, and 0 otherwise (HIGH_HHI_ASSETS). Second, in Model 2 we use the average value of HHI_ASSETS and it change (DELTA_HHI_ASSETS). Average HHI_ASSETS is used to mitigate l changes in HHI and DELTA_HHI_ASSETS is adopted to control for the change in competition and its potential impact on PE investments (Bodnaruk et al., 2008). Third, in Model 3 we measure industry concentration based on sales rather than assets (HHI_SALES). Model 4, uses an alternative measure of market competition, namely the degree of import penetration (IMPORT). Finally, Model 5 clusters standard errors by industry to account for the fact that buyouts are concentrated in some industries more than in others, as shown in Table 2. In all these cases the results that PE-backing increases with industry concentration continues to hold.[14] Overall, the results for the other independent variables are also quite stable.

[14] In an unreported regression, we also compute the four-firm concentration ratio, i.e., the ratio of the sales of the four firms with the largest market share to total industry sales. It turns out to be also significantly related to PE.

In Table 7 we move to explore robustness checks for ownership concentration, and therefore for the motivation to diversify out of the company on part of its founders. We want to rule out that the insignificance of "ownership diversification" may be caused by the specific ownership proxy we employ. In the first three models we therefore use the concentration of cash-flow rights (HHI_CF), the concentration of cash-flow rights held by controlling shareholders ((HHI_CONTROLCF), and the number of controlling shareholders whose equity stake is larger than 10% (CONTROL(N)); all variables are measured one year before the buyout. None of the variables we add turns out to be significant. Their introduction slightly erodes the statistical significance of industry concentration, which is now at the 10% confidence level, but does not change materially the estimated coefficients and marginal effects. In Model 4 we introduce an interaction of OWNERSHIP with DIVEST; the rationale is that when the largest shareholder wants to retire, because of age, then ownership should not matter, and ownership diversification should matter only in the subsample without divestment. In Model 5, we explore the idea that if the company is growing, the largest shareholder may prefer to remain in the company, diluting the incentive to cash out; for this we add a variable that interacts OWNERSHIP with the GR(SALES) variable. Also in these two models our results are not changed.

4.3. The outcome of private equity backed private buyouts

4.3.1 Main results

Table 8 looks at the effects of PE backing of private buyouts. For each Panel and variable we employ two models. Model 1 is a model with time fixed effects. Model 2 employs a fixed effects approach equivalent to a panel regression. These models are the same as in Boucly, Sraer, and Thesmar (2011).[15]

Panel A looks at two growth measures, sales and employees. After the buyout companies tend to grow less (with an insignificant coefficient, except for the fixed effect model for sales), but if they are PE-backed they grow significantly more. Looking at economic significance, we find that after the buyout, PE-backed targets experience a relative 23.00% increase in sales

[15] We also cluster Model 1 by company only and time only, obtaining the same results. Standard errors clustered by both firm and time are very similar to those clustered by time (see the web page of Mitchell Petersen at Northwestern University). The explanation is that when the number of companies is not close to the number of the time periods, it is more appropriate to cluster by low number dimension, in our case the time dimension, as suggested by Thompson (2011).

compared to bank-financed ones. For employees, the fixed effects model does not show much difference between type of sponsor. In Panel B we see that after the buyout companies tend to invest more (significantly so only in the fixed effects model), and do so significantly more when PE-backed. For assets (tangible fixed assets) PE-backed buyouts increase by 61.2% (41.2%) more than those of bank-financed ones.

Panel C looks at leverage, and shows that it increases for all companies after a buyout, but significantly more so for PE-backed deals, 24.8% more than for bank-financed deals. Finally, Panel D looks at profitability, measured by profit margin and return on sales. Profitability tends to decrease, but significantly so only for PE-backed deals. PE firm backed buyouts are associated with a decline in both profit margin (1.5%) and return on sales (6.0%).

These results point to very strong differences in post-deal company strategy and performance: PE-backed companies grow faster, invest more, and increase their leverage more than other companies. Moreover, they do not vary their employment significantly, and become less profitable. This points to a situation where these companies
We are currently working on identifying the channels through which these effects are taking place, and at separating selection and treatment effects of the PE investment.

4.3.2 Robustness of the results

Table 9 reports estimates from an alternative approach that follows Pagano, Panetta, and Zingales (1998). While our main model computes the differential effect of PE backing relative to bank backing, the model underlying Table 9 computes a separate coefficient for each of the three years after the deal. While this may be more demanding on our data, it also provides a complementary approach that tries to more precisely pin down time effects over time; the POST1, POST2, and POST3 dummies pick up such event time effects.

The results are largely consistent with those of Table 8. An interesting additional result is that the differential effect of PE backing is felt especially in the two years after the buyout for the growth variables. The effect on investment appears to be similar over time, as the effects on leverage and profitability.

4.4. Work in progress

We are currently bringing this analysis further in three main directions. First we are looking at separating selection and treatment effects, so as to deliver a cleaner causal interpretation of the effects of PE-backing. Second, we are looking into the channels through which PE-backed private buyouts achieve stronger growth. Performance improvements stem from two sources: one is the expected value creation due to PE financing, taking the company in isolation, the other results from the post-deal gains in competitive standing. We are going to measure to what extent the performance of PE-backed buyouts takes advantage of such competitive effects, looking at whether product market competition affects post-deal performance. We will also look into whether any firm characteristics also affect performance. These analyses will help us understand how the realized outcome of buyouts squares with their determinants. Third, we are looking into PE firms to see how their capabilities may affect deal outcomes: in particular, how do PE firms with different partner experience fare?

5. Conclusions

In this paper we provide an analysis of private buyouts, trying to understand the role of PE investors in this type of deals. We provide a conceptual framework for understanding both the determinants and the effects of PE backing. While our work is still preliminary and incomplete, it points to an important role of PE firms.

First, adopting and approach that aims at assuaging concerns of selection on unobservables, we find that PE investors select deals with different characteristics than banks. These companies are more profitable, faster growing, and operate in more concentrated and more dynamic industries.

Second, we verify that PE has a strong differential effect, compared to banks, on post-deal growth and corporate policy. PE-backed companies grow faster, invest more, take on more debt, and are less profitable than bank-financed companies.

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Table 1: Variables definition

This Table defines the variables we use in the regressions and provides their sources. Variables are discussed in Section 3.

Panel A: Dependent variables

Variables	Definition	Source
LEVERAGE	Total debt divided by total assets from two years before the buyout to three years after the buyout..	Amadeus
Log(ASSETS)	Logarithm of total assets from two years before the buyout to three years after the buyout.	Amadeus
Log(EMPLOYEES)	Logarithm of number of employees from two years before the buyout to three years after the buyout.	Amadeus
Log(FIX_TAN_ASSETS)	Logarithm of fixed tangible assets from two years before the buyout to three years after the buyout.	Amadeus
Log(SALES)	Logarithm of sales from two years before the buyout to three years after the buyout.	Amadeus
PE	Dummy variable equal to 1 if the buyout is backed by a PE firm, 0 if it is backed by a bank.	Zephyr, SDC, Capital IQ, Factiva, Google News
ROS	Net income divided by sales from two years before the buyout to three years after the buyout.	Amadeus
PROFITMARGIN	Operating income divided by sale from two years before the buyout to three years after the buyout.	Amadeus

Panel B: Independent variables

Variables	Definition	Source
Industry-level variables		
FIN_DEP	Median value of the financial dependence ratio at 2-digit NACE REV1.1 Code level. The financial dependence ratio is calculated as (capital expenditure – operating cash flow)/ capital expenditure for each company one year before the buyout.	Amadeus
HHI_ASSETS	Herfindahl-Hirschman Index computed on total assets at 2-digit NACE REV1.1 Code level in the year before the buyout. We also use HHI-SALES as an alternative, based on sales.	Amadeus
INDUSTRY_GROWTH	Median value of sales growth rate at 2-digit NACE REV1.1 Code level.	Amadeus
Firm-level variables		
CAPEX	Capital expenditure, calculated as the ratio of change in fixed tangible assets to lagged fixed assets.	Amadeus
CASH	Ratio of cash and cash equivalents divided by total assets one year before the buyout.	Amadeus
COMPANY SIZE	Log of total assets one year before the buyout.	Amadeus
DIVIDEND	Dummy variable equal to 1 if the buyout company paid dividends one year before the buyout, 0 otherwise.	Annual Reports
DIVEST	Dummy variable equal to 1 is the age of largest shareholder is above 65 or the largest shareholder is family (identified from news and ownership report), 0 otherwise.	Annual Reports
GAZELLE	Dummy variable equal to 1 if company size is above the median of the sample and age is below the median of the sample, 0 otherwise.	Annual Reports
GR(SALES)	Sales growth rate one year before the buyout for the company.	Amadeus
LEVERAGE	Ratio of total debt divided by total asset one year before the buyout.	Amadeus
OWNERSHIP	Percentage of equity stake of the largest shareholder in the company one year before the buyouts.	Annual Reports
POST	Dummy variable equal to 1 for the 3 years following the buyouts and to 0 for the 2 years before the buyouts.	Zephyr, SDC, Captial IQ, Factiva, Google News
POST1, POST2, POST3	Dummy variables which equal 1 for the first (second/third) year following the buyouts and 0 for all other years.	Same as for POST
PROD_SALES	Sales per employee one year before the buyout.	Amadeus
PROFIT	Ratio of total net income to total assets of the company one year before the buyout.	Amadeus
TANGIBILITY	Ratio of total tangible assets to total assets of the company one year before the buyout.	Amadeus

Panel C: Independent variables (Robustness check)

Variables	Definition	Source
Industry-level variables		
AVG_HHI_ASSETS	Average of HHI_ASSETS at 2-digit NACE code industry level in the two years before the deal.	Amadeus
DELTA_HHI_ASSETS	Change in HHI_ASSETS at 2-digit NACE code industry level over the two years before the deal.	Amadeus
HIGH_HHI_ASSETS	Dummy variable equal to 1 if HHI_ASSETS is above the sample median across industries in the year before the buyout; 0 otherwise.	Amadeus
IMPORT	Ratio of (Imports)/(Imports+ Sales) at 2-digit ISIC REV 3. Code level from the OECD STAN Database (converted it into 2-digit NACE REV1.1 Code level)	OECD STAN Database
Firm-level variables		
CONTROL(N)	Number of shareholders whose equity stake is larger than 10% one year before the buyout.	Annual Returns
HHI_CF	Herfindahl index of cash flow rights concentration one year before the buyout.	Annual Returns
HHI_CONTROLCF	Herfindahl index of cash flow rights concentration by shareholders whose equity stake is larger than 10% one year before the buyout.	Annual Returns

Table 2: Sample

This Table shows the distribution of private buyouts by time and industry. The full sample includes all private buyouts, and is split into those backed by a PE firm and a bank. Panel A shows the distribution over time. Panel B shows the distribution across industries. We use the Fama-French 10-industry classification for each company's primary business. We divide Fama-French's "Others" category into business services and construction, due to the large number of deals in these industries. The "Other" category therefore refers to the transportation and hotels industries.

Panel A: Distribution of private buyouts over time

Year	**Full sample**		**PE-backed**		**Bank-backed**	
	N	%	N	%	N	%
2003	38	17.12	17	14.17	21	20.59
2004	43	19.37	22	18.33	21	20.59
2005	39	17.57	21	17.50	18	17.65
2006	50	22.52	28	23.33	22	21.57
2007	28	12.61	18	15.00	10	9.80
2008	24	10.81	14	11.67	10	9.80
Total	**222**	**100**	**120**	**100.00**	**102**	**100.00**

Panel B: Distribution of private buyouts across industries

Industry	**Full sample**		**PE-backed**		**Bank-backed**	
	N	%	N	%	N	%
Consumer Non-durables	28	12.61	9	7.50	19	18.63
Consumer Durables	6	2.70	3	2.50	3	2.94
Manufacturing	30	13.51	16	13.33	14	13.73
High-Tech	17	7.66	8	6.67	9	8.82
Telecom	1	0.45	1	0.83	0	0.00
Wholesale & Retail	52	23.42	33	27.50	19	18.63
Healthcare & Drugs	1	0.45	0	0.00	1	0.98
Construction	24	10.81	7	5.83	17	16.67
Business Services	44	19.82	31	25.83	13	12.75
Other	19	8.56	12	10.00	7	6.86
Total	**222**	**100**	**120**	**100**	**102**	**100**

Table 3: Correlation among independent variables

This Table shows Peason correlation coefficients among independent variables. Variables are defined in the Table 1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	HHI_ ASSETS	FIN_DEP	DIVI-DEND	CAPEX	GR (SALES)	INDUSTRY_ GROWTH	GAZELLE	OWNER -SHIP	DIVEST	PROD-SALES	TANGI-BILITY	LEVER-AGE	PROFIT	CASH
HHI_ASSETS	1.000													
FIN_DEP	0.105	1.000												
DIVIDEND	0.033	-0.135**	1.000											
CAPEX	-0.057	-0.139**	0.057	1.000										
GR(SALES)	0.025	0.108	-0.004	0.306***	1.000									
INDUSTRY_ GROWTH	0.089	-0.580***	0.125*	0.073	0.105	1.000								
GAZELLE	0.032	-0.004	-0.033	0.085	0.121	0.023	1.000							
OWNERSHIP	-0.024	-0.010	-0.009	0.056	-0.141**	0.053	-0.196	1.000						
DIVEST	0.023	-0.044	0.061	-0.017	-0.035	0.049	-0.056	0.055	1.000					
PROD_ SALES	-0.032	-0.174***	-0.001	0.005	0.125	0.182***	0.041	0.131*	0.033	1.000				
TANGIBLITY	0.125*	0.085	-0.042	0.256***	-0.054	-0.227***	0.039	0.037	0.123	-0.307***	1.000			
LEVERAGE	0.055	0.110	-0.090	0.080	0.064	-0.021	0.137**	-0.101	-0.023	-0.157**	0.325***	1.000		
PROFIT	0.004	0.155**	0.130**	0.190***	0.210**	-0.001	0.077	0.021	-0.019	-0.103	0.010	-0.030	1.000	
CASH	-0.056	0.010	-0.018	0.030	0.012	-0.031	-0.041	-0.027	0.026	0.004	-0.247***	-0.340***	0.303***	1.000

Table 4: Descriptive statistics on private buyouts

This Table provides descriptive statistics for all independent variables. Variables are defined in the Table 1. The left panel reports data for bank-backed buyouts, the second panel for PE-backed buyouts. For each variable, we perform a test for the difference of means across the two sub-samples. For dummy variables the Mean column reports the frequency. The last column reports the test statistic; *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Bank-backed buyouts (N=102)					PE-backed buyouts (N=120)						
Variables	Mean	St.Dev.	p25	Median	p75	Mean	St.Dev..	p25	Median	p75	DIFF	
HHI_ASSETS	0.081	0.067	0.031	0.057	0.117	0.103	0.080	0.046	0.084	0.133	-0.022	**
FIN_DEP	1.099	0.580	0.670	1.084	1.518	1.093	0.569	0.743	1.074	1.518	0.007	
DIVIDEND	0.363	--	--	--	--	0.492	--	--	--	--	-0.129	**
CAPEX	0.015	0.272	-0.131	-0.018	0.131	0.096	0.298	-0.067	0.059	0.296	-0.081	**
GR(SALES)	0.096	0.159	-0.016	0.062	0.164	0.212	0.185	0.070	0.190	0.356	-0.117	***
INDUSTRY _GROWTH	0.028	0.060	-0.023	0.024	0.065	0.044	0.059	-0.012	0.042	0.097	-0.156	**
GAZELLE	0.676	--	--	--	--	0.842	--	--	--	--	-0.165	***
OWNERSHIP	0.657	0.276	0.425	0.624	0.970	0.609	0.264	0.404	0.500	0.883	0.048	*
DIVEST	0.25	--	--	--	--	0.15	--	--	--	--	0.095	**
PROD_ SALES	154.229	124.880	77.747	109.495	175.024	171.275	142.687	79.183	113.978	210.235	-17.046	
TANGIBLITY	0.254	0.191	0.098	0.205	0.375	0.213	0.177	0.075	0.162	0.311	0.041	*
LEVERAGE	0.152	0.150	0.023	0.120	0.233	0.149	0.165	0.013	0.084	0.233	0.003	
PROFIT	0.045	0.044	0.014	0.036	0.066	0.080	0.058	0.040	0.069	0.116	-0.035	***
CASH	0.117	0.131	0.006	0.063	0.192	0.134	0.129	0.023	0.092	0.237	-0.017	

Table 5: Determinants of PE-backed private buyouts

This Table reports coefficient estimates from logit regressions and from a linear probability model for the determinants of PE backing of buyouts. The dependent variable is PE, which takes value 1 if the buyout is backed by a PE firm and 0 if it is backed by a bank. Variables are defined in the Table 1. All models are discussed in Section 4. Robust standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Model 1 BASE 1	Model 2 BASE 2	Model 3 HHI	Model 4 HHI-Subsample	Model 5 Company Size	Model 6 LPM
HHI_ASSETS			6.442*	12.52*	1.062*	1.253**
			(3.504)	(6.546)	(0.550)	(0.564)
FIN_DEP	-0.308		-0.478	-0.008	-0.0927	-0.0857
	(0.497)		(0.572)	(0.550)	(0.098)	(0.098)
DIVIDEND	0.498	0.542	0.455	0.444	0.0566	0.0878
	(0.374)	(0.382)	(0.373)	(0.415)	(0.071)	(0.072)
CAPEX	0.199	0.252	0.095	-0.060	0.0188	0.00523
	(0.635)	(0.623)	(0.640)	(0.706)	(0.119)	(0.120)
INDUSTRY_GROWTH		6.773				
		(6.342)				
GR(SALES)	2.873**	2.657**	2.914**	3.523**	0.575**	0.561**
	(1.128)	(1.146)	(1.210)	(1.319)	(0.232)	(0.230)
GAZELLE	0.668	0.685*	0.691*	0.908*		0.131
	(0.411)	(0.410)	(0.409)	(0.474)		(0.079)
OWNERSHIP	0.026	-0.068	0.101	0.129	0.021	0.019
	(0.709)	(0.714)	(0.718)	(0.764)	(0.133)	(0.135)
DIVEST	-0.493	-0.471	-0.471	-0.318	-0.094	-0.091
	(0.398)	(0.404)	(0.421)	(0.477)	(0.081)	(0.081)
PROD_SALES	0.0006	0.0006	0.0002	0.0002	-0.0001	0.00003
	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)
TANGIBLITY	-1.680	-1.381	-2.165*	-2.045*	-0.463**	-0.381*
	(1.087)	(1.106)	(1.130)	(1.126)	(0.217)	(0.216)
LEVEARGE	-0.055	-0.176	0.398	0.355	-0.002	0.080
	(1.194)	(1.210)	(1.265)	(1.271)	(0.229)	(0.230)
PROFIT	12.640***	12.060***	12.830***	12.720**	2.416***	2.336***
	(3.647)	(3.555)	(3.649)	(3.981)	(0.615)	(0.615)
CASH	-0.042	0.251	0.025	0.204	0.040	0.036
	(1.555)	(1.562)	(1.545)	(1.682)	(0.281)	(0.281)
COMPANY SIZE					0.101**	
					(0.035)	
INDUSTRY FE	Yes	Yes	Yes	Yes	Yes	Yes
YEAR FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	211	211	211	189	213	213
Adjusted R^2					0.212	0.188
Pseudo R^2	0.216	0.218	0.232	0.270		

Table 6: Determinants of PE-backed private buyouts: Alternative measures of product market competition

This table reports coefficient estimates from logit regressions for the determinants of PE sponsoring of buyouts, using different product market competition proxies. The dependent variable is PE, which takes value 1 if the buyout is backed by a PE firm and 0 if it is backed by a bank. Variables are defined in the Table 1. All models are discussed in Section 4. Robust standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Model 1: HIGH HHI	Model 2: AVERAGE HHI	Model 3: HHI BASED ON SALES	Model 4: IMPORT	Model 5: CLUSTER AT INDUSTRY LEVEL
HIGH_HHI_ASSETS	1.299**				
	(0.472)				
AVG_HHI_ASSETS		5.907*			
		(3.602)			
DELTA_HHI_ASSETS		5.769			
		(5.285)			
HHI_SALES			5.355*		
			(3.258)		
IMPORT				3.418*	
				(1.843)	
HHI_ASSETS					5.815**
					(2.645)
FIN_DEP	-0.586	-0.519	-0.268	-0.448	-0.366
	(0.544)	(0.570)	(0.526)	(0.705)	(0.429)
DIVIDEND	0.363	0.487	0.476	-0.523	0.488
	(0.387)	(0.384)	(0.375)	(0.554)	(0.479)
CAPEX	0.184	0.0734	0.115	0.986	0.168
	(0.648)	(0.649)	(0.639)	(1.203)	(0.506)
GR(SALES)	2.669**	2.932**	2.813**	3.037	3.180***
	(1.212)	(1.208)	(1.157)	(1.847)	(0.904)
GAZELLE	0.582	0.689*	0.634	0.0932	0.822**
	(0.421)	(0.407)	(0.405)	(0.586)	(0.408)
OWNERSHIP	-0.078	0.088	0.173	0.622	0.062
	(0.708)	(0.712)	(0.719)	(1.162)	(0.687)
DIVEST	-0.328	-0.484	-0.537	0.149	-0.606
	(0.428)	(0.426)	(0.409)	(0.605)	(0.466)
PROD_SALES	0.0001	0.0003	0.0003	0.004	0.0007
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)
TANGIBLITY	-2.634**	-2.154*	-2.355**	-4.592**	-1.613
	(1.134)	(1.121)	(1.139)	(1.714)	(1.491)
LEVEARGE	0.051	0.360	0.123	1.786	0.208
	(1.209)	(1.252)	(1.208)	(1.989)	(1.125)
PROFIT	13.770***	12.790***	12.900***	19.830**	12.400***
	(3.714)	(3.692)	(3.689)	(6.985)	(3.489)
CASH	-0.376	0.030	0.144	-0.462	0.504
	(1.544)	(1.557)	(1.508)	(3.006)	(1.217)
INDUSTRY FE	Yes	Yes	Yes	Yes	Yes
YEAR FE	Yes	Yes	Yes	Yes	Yes
Observations	211	211	211	211	213
Pseudo R^2	0.245	0.233	0.225	0.329	0.209

Table 7: Determinants of PE-backed private buyouts: Alternative measures of ownership diversification

This Table reports coefficient estimates from logit regressions for the determinants of PE sponsoring of buyouts, using different ownership diversification proxies The dependent variable is PE, which takes value 1 if the buyout is backed by a PE firm and 0 if it is backed by a bank. Variables are defined in the Table 1. All models are discussed in Section 4. Robust standard errors are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Model 1: CONCENTRATI -ON OF CASH FLOW RIGHTS	Model 2: NUMBER. OF CONTROLLING SHAREHOLDERS	Model 3: CONCENTRATION OF CASH FLOW RIGHTS (2)	Model 4: INTERA- CTION (1)	Model 5: INTERA- CTION (2)
HHI_ASSETS	6.383*	6.309*	6.463*	6.488*	6.675**
	(3.504)	(3.510)	(3.586)	(3.525)	(3.357)
FIN_DEP	-0.465	-0.480	-0.423	-0.503	-0.462
	(0.571)	(0.580)	(0.575)	(0.577)	(0.520)
DIVIDEND	0.451	0.444	0.509	0.537	0.462
	(0.372)	(0.373)	(0.376)	(0.379)	(0.382)
CAPEX	0.121	0.121	0.150	0.024	0.188
	(0.635)	(0.642)	(0.643)	(0.649)	(0.668)
GR(SALES)	2.862**	2.849**	2.970**	3.187**	6.602**
	(1.169)	(1.171)	(1.193)	(1.228)	(2.757)
GAZELLE	0.670	0.649	0.668	0.728*	0.833**
	(0.413)	(0.419)	(0.414)	(0.415)	(0.420)
HHI_CF	-0.094				
	(0.655)				
CONTROL(N)		0.064			
		(0.159)			
HHI_CONTROLCF			-0.180		
			(0.648)		
OWNERSHIP				-0.298	1.105
				(0.831)	(0.877)
OWNERSHIP *DIVEST				2.185	
				(1.472)	
OWNERSHIP * GR(SALES)					-6.327*
					(3.798)
DIVEST	-0.461	-0.467	-0.475	-2.044*	-0.504
	(0.418)	(0.419)	(0.420)	(1.150)	(0.430)
PROD_SALES	0.0003	0.0003	0.0003	0.0004	0.0002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
TANGIBLITY	-2.155*	-2.068*	-2.124*	-2.097*	-2.470**
	(1.106)	(1.160)	(1.102)	(1.129)	(1.090)
LEVERAGE	0.365	0.297	0.0315	0.394	0.451
	(1.221)	(1.239)	(1.210)	(1.263)	(1.251)
PROFIT	12.900***	13.140***	13.050***	12.950***	13.390***
	(3.630)	(3.668)	(3.625)	(3.618)	(3.737)
CASH	-0.027	-0.086	-0.015	0.044	-0.050
	(1.577)	(1.561)	(1.594)	(1.571)	(1.542)
INDUSTRY FE	Yes	Yes	Yes	Yes	Yes
YEAR FE	Yes	Yes	Yes	Yes	Yes
Observations	211	211	210	211	211
Pseudo R^2	0.232	0.232	0.237	0.239	0.242

Table 8: Effects of PE sponsoring of buyouts

This table shows OLS estimates of the effects of PE backing on post-buyout targets relative to bank-backed deals. POST is a dummy which equals 1 for the 3 years following the buyout and 0 for the 2 years before the buyout. PE is a dummy equal 1 if the buyout is PE-backed, and 0 if it is bank-backed. Panel A reports the change in growth measures. Panel B reports the change in investment measures. Panel C reports the change in leverage. Panel D reports change in profitability measures. Error terms are clustered as indicated in the table. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A Growth

	Log(SALES)		Log(EMPLOYEES)	
	Model 1	Model 2	Model 1	Model 2
POST	-0.056	0.116**	-0.106	0.062
	(0.093)	(0.048)	(0.112)	(0.048)
POST*PE	0.630***	0.230***	0.420**	0.065
	(0.137)	(0.059)	(0.174)	(0.077)
COMPANY FE	No	Yes	No	Yes
YEAR FE	Yes	Yes	Yes	Yes
St. errors clustering	Time & Company	Time & Company	Time & Company	Time & Company
Observations	957	957	954	954
Adjusted R^2	0.098	0.857	0.048	0.751

Panel B Investments

	Log(ASSETS)		Log(FIX_TAN_ASSETS)	
	Model 1	Model 2	Model 1	Model 2
POST	0.072	0.244***	-0.274	-0.228***
	(0.095)	(0.047)	(0.166)	(0.063)
POST*PE	0.993***	0.612***	0.551*	0.412***
	(0.148)	(0.061)	(0.307)	(0.082)
COMPANY FE	No	Yes	No	Yes
YEAR FE	Yes	Yes	Yes	Yes
St. errors clustering	Time & Company	Time & Company	Time & Company	Time & Company
Observations	987	987	954	954
Adjusted R^2	0.192	0.849	0.028	0.872

Panel C Leverage

	LEVERAGE	
	Model 1	Model 2
POST	0.168***	0.152***
	(0.033)	(0.014)
POST*PE	0.240***	0.248***
	(0.028)	(0.023)
COMPANY FE	No	Yes
YEAR FE	Yes	Yes
St. errors clustering	Time & Company	Time & Company
Observations	911	911
Adjusted R^2	0.406	0.652

Panel D Profitability

	PROFITMARGIN		ROS	
	Model 1	Model 2	Model 1	Model 2
POST	-0.001	0.012**	-0.012**	-0.001
	(0.004)	(0.004)	(0.004)	(0.004)
POST*PE	0.001	-0.015**	-0.041***	-0.060***
	(0.007)	(0.006)	(0.006)	(0.006)
COMPANY FE	No	Yes	No	Yes
YEAR FE	Yes	Yes	Yes	Yes
St. errors clustering	Time & Company	Time & Company	Time & Company	Time & Company
Observations	955	955	965	965
Adjusted R^2	0.000	0.609	0.151	0.398

Table 9: Effects of PE sponsoring of buyouts: robustness, alternative model

This table shows OLS estimates of the effects of PE backing on post-buyout targets relative to bank-backed deals. POST1 (2/3) is a dummy which equals 1 if it is the first (second/third) year following the buyouts and 0 for the others. PE is a dummy equal 1 if the buyout is sponsored by a PE firm and 0 if it is backed by a bank. Panel A reports the change in growth. Panel B reports the change in investments. Panel C reports the change in leverage. Panel D reports change in profitability. Error terms are clustered as indicated in the table. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A Growth

	Log(SALES)		Log(EMPLOYEES)	
	Model 1	Model 2	Model 1	Model 2
POST1	-0.188**	0.0209	-0.107	0.086*
	(0.079)	(0.070)	(0.103)	(0.049)
POST2	-0.060	0.114*	-0.111	0.075*
	(0.118)	(0.064)	(0.125)	(0.044)
POST3	0.125	0.256***	-0.0974	0.0175
	(0.120)	(0.058)	(0.127)	(0.107)
POST1*PE	0.706***	0.280***	0.486**	0.084
	(0.129)	(0.078)	(0.176)	(0.077)
POST2*PE	0.686***	0.261***	0.465**	0.111
	(0.148)	(0.074)	(0.198)	(0.073)
POST3*PE	0.477**	0.139	0.260*	-0.0394
	(0.194)	(0.099)	(0.143)	(0.180)
COMPANY FE	No	Yes	No	Yes
YEAR FE	Yes	Yes	Yes	Yes
St. errors clustering	Time & Company	Time & Company	Time & Company	Time & Company
Observations	957	957	954	954
Adjusted R^2	0.098	0.859	0.046	0.752

Panel B Investments

	Log(ASSETS)		Log(FIX_TAN_ASSETS)	
	Model 1	Model 2	Model 1	Model 2
POST1	0.018	0.230***	-0.297*	-0.220**
	(0.099)	(0.062)	(0.159)	(0.069)
POST2	0.010	0.218**	-0.392**	-0.289***
	(0.132)	(0.067)	(0.174)	(0.078)
POST3	0.213**	0.295***	-0.110	-0.170
	(0.084)	(0.052)	(0.184)	(0.106)
POST1*PE	0.994***	0.601***	0.531*	0.339***
	(0.141)	(0.080)	(0.299)	(0.091)
POST2*PE	1.089***	0.666***	0.674**	0.519***
	(0.163)	(0.082)	(0.288)	(0.100)
POST3*PE	0.900***	0.572***	0.456	0.419**
	(0.171)	(0.076)	(0.382)	(0.144)
COMPANY FE	No	Yes	No	Yes
YEAR FE	Yes	Yes	Yes	Yes
St. errors clustering	Time & Company	Time & Company	Time & Company	Time & Company
Observations	987	987	954	954
Adjusted R^2	0.191	0.849	0.025	0.872

Panel C Leverage

	LEVERAGE	
	Model 1	Model 2
POST1	0.183***	0.172***
	(0.045)	(0.018)
POST2	0.171***	0.151***
	(0.032)	(0.018)
POST3	0.144***	0.123***
	(0.026)	(0.021)
POST1*PE	0.225***	0.231***
	(0.036)	(0.029)
POST2*PE	0.223***	0.239***
	(0.033)	(0.031)
POST3*PE	0.282***	0.284***
	(0.032)	(0.035)
COMPANY FE	No	Yes
YEAR FE	Yes	Yes
St. errors clustering	Time & Company	Time & Company
Observations	911	911
Adjusted R^2	0.405	0.652

Panel D Profitability

	PROFITMARGIN		ROS	
	Model 1c	Model 2	Model 1c	Model 2
POST1	0.004	0.018**	-0.034***	-0.009
	(0.006)	(0.006)	(0.007)	(0.008)
POST2	-0.003	0.011**	-0.034***	-0.010
	(0.004)	(0.005)	(0.006)	(0.008)
POST3	-0.007	0.006	-0.039***	-0.012
	(0.005)	(0.006)	(0.005)	(0.010)
POST1*PE	0.011*	-0.017**	-0.018**	-0.069***
	(0.005)	(0.008)	(0.006)	(0.011)
POST2*PE	0.013*	-0.015**	-0.013	-0.064***
	(0.007)	(0.007)	(0.009)	(0.012)
POST3*PE	0.003	-0.017*	-0.021**	-0.068***
	(0.012)	(0.009)	(0.009)	(0.014)
COMPANY FE	No	Yes	No	Yes
YEAR FE	Yes	Yes	Yes	Yes
St. errors clustering	Time & Company	Time & Company	Time & Company	Time & Company
Observations	955	955	976	976
Adjusted R^2	0.001	0.611	0.067	0.411

Chapter 3

Private Equity and the Professionalization of Private Buyout Firms

Abstract

This paper investigates the role of private equity investors in the build-up of professional management teams in private to private transactions. Using hand-collected data on UK private buyouts, we find that private equity firms are more likely to appoint an outside CEO, and that they are more active in recruiting other board members, than is the case in bank-financed deals. This leads to an increase in overall board size in private equity transactions as opposed to a decrease in board size in bank-backed ones. We conclude that private equity firms are actively involved in their portfolio companies that go beyond the supply of funds or monitoring activities typical of more traditional financial intermediaries.

1. Introduction

Private equity (PE) investors are expected to play an active role beyond that of traditional financial intermediaries that provide capital. In fact, it has been shown that this is the case in venture capital deals, where investors exercise both governance and support (see Da Rin, Hellmann, Puri (2013) for a survey), and in public to private LBOs where they mostly exercise governance (see Kaplan and Strömberg (2009) for a survey). In this paper we focus on the role of private equity in private to private transactions (private buyouts hereafter) and examine whether private equity plays a role in providing support and expertise to the company beyond exercising governance. The additional role of human capital may be crucial for private buyouts. In private buyouts, the agency problem is not a severe issue as ownership is concentrated (Bodnaruk et al., 2008; Chung, 2011). Instead, the priority is to foster the growth of private companies, so called "growth LBOs" (Boucly et al., 2011). As Zingales (2000) suggested, human capital is key to the development of companies. We therefore investigate whether PE firms are active in making leadership changes as well as in helping build up professional teams in private buyouts.

We construct a hand-collected dataset of private buyouts that allows us to investigate the influence of PE firms on boards. We gathered detailed information on board members, CEO characteristics, and relevant financial statements both before and after private buyouts. We obtain 222 private buyouts in the UK between 2003 and 2008, which coincides with the second wave of buyout transactions. Out of 222 observations, 120 are sponsored by private equity firms and the rest is without PE sponsorship and only receive debt from banks (defined

as bank backed (or financed) hereafter). We use bank financed private buyouts as a control group, to filter out the unobservable factors driving the private buyouts. The comparison also aims to highlight whether there is an additional role of PE sponsorship beyond the alleviation of financial constraints and monitoring[1]. Banks are traditional financial intermediaries. They seldom initiate board intervention and thus are perceived as "passive investors" (Winton and Yerramilli, 2008). On the contrary, PE firms are regarded as "active investors" by controlling the board and being actively involved in the board (Kaplan and Stromberg, 2009).

As our first step in the analysis, we investigate the impact of PE firms on board turnover, in terms of firing the existing board members and hiring new board members. We find that PE firms are active in professional team building. Relative to banks, private buyouts financed by PE firms are more likely to dismiss board members and recruit new ones. We also find that the more stake held by PE firms, the closer involvement they have on board restructuring. Additionally, we show that PE firms are more active in hiring rather than replacing board members.

Following the activities of board member turnover, the natural next step is to shed light on the overall change in board size. Yermack (1996) shows that small boards are associated with high firm value. In line with the governance role of PE firms, Cornelli and Karakas' (2013) provide evidence that board size declines drastically after public-to-private buyouts. However, as we observe a significant effort of PE firms in recruiting new board members, in the context of growth private buyouts, we contend that PE firms may increase board size to increase the capacity to advise and support CEOs. We show that while bank financed private buyouts reduce board size after buyouts, PE sponsored ones increase board size.

The final step is to investigate the role of PE firms in a leadership change for the target company by looking at the change in a CEO. Kaplan et al. (2012) document that an outside CEO possesses superior managerial skills compared to an inside CEO. Moreover, a nominated outside CEO is more inclined to support the policy changes, while the inside CEO is more reluctant to alter policies which they have helped develop (Helmich, 1974). We find that PE firms are more likely to introduce an outside CEO on board after private buyouts. The

[1] The only difference between PE sponsored transactions and bank financed one is that PEs make equity investment. Both types of transactions have debt financing, even if we do not have complete information on the name of the bank. This research design using bank backed private buyouts as a control group controls for the debt financing and therefore address the additional role of PE. In other words, it looks at the role of PE beyond the traditional financial intermediary.

PE ownership is positively associated with the likelihood of an outside CEO appointment. The finding is consistent with the notion provided by Hellmann and Puri (2002) that bringing in an outside CEO constitutes a significant move in the professionalization of the company.

We conduct additional analyses to examine the robustness of our results and the interaction between board member turnover and CEO turnover. We rule out that the board member turnover is driven by CEO turnover and present consistent results of the role of PE firms on the board.

Taken together, our paper documents that PE firms are active on the board and foster the human resources in private buyouts. However, to the extent that the choice of being backed by a PE firm is not random, we need to be cautious in interpreting the results, and cannot interpret them as in a causal way.

Our contributions are threefold. First, we provide information on board structure of private buyouts, which is hitherto largely unexplored but economically important. We fill the gap by using hand-collected data. Unlike the evidence on the large public-to-private buyouts, where PE firms are active in replacing underperforming managers and closely monitor board activities, in order to mitigate agency problems, the economic rationale of private buyouts is distinct from public to private transactions (Metrick and Yasuda, 2010). Buyout Track[2] (2011) mentions the primary goal of mid-market buyouts is to create new jobs and stimulate additional sales at portfolio companies. We then find that in growth private buyouts, PE firms are active in recruiting a capable CEO and other board members. This turns out the increase in board size. It is in line with the conjecture that when advice is needed on board, the board size increases (Coles et al., 2008). Second, we add to a growing body of literature on human capital of PE firms. We use traditional financial intermediaries as a control group, and show the additional support function of PE firms on team building and CEO turnover relative to that of traditional financial intermediaries. Third, our paper is related to the literature on board turnover and board size. The previous literature tends to focus on large public companies or companies that underwent delisting. The evidence on private companies is scant due to data unavailability. Our research highlights the importance of board activities also for private companies.

[2] Deloitte Buyout Track 100 by Sunday Times has ranked Britain's 100 private equity-backed mid-market companies with the fastest-growth profile every year since 2007.

The remainder of the paper proceeds as follows. In the next section, we describes our data sources and sample formation, and presents descriptive statistics. Empirical results are provided in Section 3. Section 4 concludes.

2. Data description

2.1 .Sample

To conduct the study, we use a unique hand-collected data. Private buyout transactions are gathered from two datasets (i) Zephyr; (ii) SDC. The following criteria are applied: (i) Transactions are announced between January 2003 and December 2008[3]; (ii) The acquisition techniques are leveraged buyouts or management buyouts or management buyins or institutional-led buyouts; (iii) At least 50% of stake is acquired during the transaction; (iv) The transaction is completed; (v) The target nation is UK; (vi) The target is a private company or a subsidiary; (vii) The target is not located in either primary industries or utility industries or financial service industries. We indentify 222 independent private buyouts with available audited financial statements both before and after LBOs (Detailed information are provided in Chapter 2). Out of the 222 independent buyouts, 54.05% (120) private buyouts are sponsored by PE firms. We classify private buyouts as PE sponsored if a private equity firm or venture capital firm has invested in the equity of the buyout company, no matter whether PE firms also provide debt or arrange debt from other banks. The rest of private buyouts are mainly financed by the debt from banks without receiving equity investments from the financiers. We use private buyouts without PE sponsors— "bank backed" private buyouts as a control group. This design filters out the unobservable factors underlying private buyouts and directs our focus on the support function of a PE investor.

2.2. Board information

We collect board information from annual reports and annual returns provided by Fame database. Annual report discloses the list of board members and their equity holding in the

[3]We choose the year 2003 as the starting year and 2008 as the ending year for two reasons: (i) After the crash of credit market in 2000 and 2001, the LBO market picked up in 2002 (high-tech bubble) and recovered in 2003. It slowed down after the arrival of the financial crisis in 2007 and then fell abruptly in 2008. The 2003-2008 time period presents a clean buyout wave. Equally important, the data coverage for private companies in Amadeus and Fame has improved dramatically since 2001. Because two years' accounting information preceding the transactions is needed to calculate accounting ratios, e.g. sales growth rate before buyouts. This implies 2003 will be a good starting year with high quality of previous accounting information. Moreover, Strömberg (2008) points out that there are some onerous corporate governance regulations imposed in 2001-2002. So 2003 will be a clean post-event year. Taking into account all these factors, we decide to focus on private to private buyouts from 2003 to 2008.

company. It also reports departing, new hiring, and remaining members during the fiscal year. Annual returns is an official document filed to Company House, to provide detailed board member information and ownership structure of the company. Board member information includes nationality, age, function and address. We cross-check the obtained information and augment it with the news releases of Capital IQ, Factiva, Google and company website. We also use "Duedil"[4] website to supplement the information on employment history of board members.

For the board data, we proceed in the following way. We retrieve two sets of information from consolidated or unconsolidated annual reports with 0/1 subsidiary: company primary business description and the list of board members. We then gather detailed information on features of board members from both annual returns and news, such as age, function and their equity holding. A CEO can be identified from the following sources: (i) annual report; (ii) annual returns; (iii) news. In some cases, if the CEO is unidentified after applying the above filters, we regard the board member who signed the financial statements as the CEO. An outside CEO is any person who is not an incumbent board member or a current/ previous employee of the company or its subsidiaries. If the company's primary business is a holding company providing management service, together with the fact that only one or two board members, it is a nominal board in a shell company. We then trace down the annual reports which mention real operational business activities and verify the board information via annual returns and news to identify the operational board.

For the analysis, we get the detailed information on board members (especially CEOs) one year before the buyout and one year after the LBOs. We also obtain the information on the board size and board turnover, in terms of outgoing members and incoming members for the consecutive three years after buyouts. Using financial statements provided by Amadeus, we compute several financial measures for each deal and the concentration ratio at two-digit NACE code industry level each year. For some companies, the duration of annual reports is larger/greater than 12 months, we extrapolate the figures of income statements to 12 month period to make them comparable.

2.3. Variables definition

In this subsection, we describe the variables we use in the empirical tests.

[4] https://www.duedil.com

2.3.1 Dependent variables

Board turnover: SHARE_OUTGOING (SHARE_INCOMING) is the board turnover caused by outgoing (incoming) board members. It is calculated as the number of board members departing (incoming) on a board over two consecutive years, divided by average board size in these two years. We measure the variables over both post-transaction year (one year after private buyouts) and years after post-transaction (two years after private buyouts).

CEO turnover: If the CEO of the buyout company changes in the year after the buyout relative to the year before the buyout, we record it as CEO change. We further create a dummy variable whether the new CEO is from the inside or the outside. OUTSIDE_CEO is a dummy variable which takes value 1 if a private buyout company hired an outside CEO after buyouts and 0 otherwise. An outsider is a person who does not sit on the previous board of the buyout target. He/she is also not an employee of the target company or its subsidiaries. In case an inside board member or employee replaces the CEO, he/she is not considered as an outside CEO. We measure this variable for the post-transaction period, when the major changes of CEOs take place (Gong and Wu, 2011, Guo et al., 2011). Post-transaction period is not researched as there is rare CEO turnover after post-transaction year. In my sample, out of 222 observations, only 2 companies change CEOs after post-transaction year, corresponding to 0.9% of total sample.

Board size: BOARD_SIZE is the number of board members. It is measured for each year between two years before the buyout and three years after the buyout. We also take exit into account. It explains the different number of observations of board size across times.

2.3.2 Key independent variables

DUM_PE: PE is a dummy variable that equals 1 if private buyouts are backed by PE investors and 0 if they are backed by banks.

PE ownership: PE_OWNERSHIP is calculated as the percentage of equity held by PE investors, which is used to explore the variation within PE sponsors. Similar to the proxy used by Anderson et al. (2009) for family businesses, we use the fraction of PE ownership to capture their control incentive. We place no minimum ownership threshold and instead use a continuous measure. When we look at the PE ownership distribution, only 9 targets out of

120 have PE ownership less than 10%. The rest 92.5% of PE sponsored LBO targets is associated with a PE controlling shareholder.

2.3.3 Control variables

Board characteristic: OLD_BOARD is the ratio of the number of board members whose age is above 65 to the board size. These old board members are approaching retirement and thus contribute to a high departing board turnover.

CEO characteristics: OLD_CEO is a dummy variable which takes 1 if CEO age is above 65 and 0 otherwise. CEO_AGE is the age of CEO in one-year before the buyouts measured from the birth date. A young CEO is expected to have a low likelihood of CEO turnover since he/she is not ready for retirement (Fosberg, 2001; Mobbs and Rheja, 2011). CEO_OWNERSHIP is the fraction of equity stake held by a CEO. CEO ownership implies the entrenchment power of CEOs. These CEOs prevent boards from incorporating new information and making strategic changes. Thus, PE firms prefer to remove them and hire new ones who can facilitate changes, most likely from the outside (Gong and Wu, 2011).

Performance: Previous studies provide ample evidence on the inverse relationship between board turnover, CEO turnover and performance. There are two proxies for performance. ROA is a proxy for profitability. It is revealed by the literature that profitability negatively impacts board member departure (Kaplan, 1995, Lehn and Zhao, 2006). SALEGROWTH is a proxy for growth potential. If managers fail to seize growth opportunity, they are more likely to be replaced (Opler & Titman, 1993).

Tangibility: TANGIBILITY is measured as the ratio of tangible assets to total assets. Tangible assets intensive companies less rely on firm-specific human capital. Therefore, they are more likely to dismiss managers and hire new board members. Kaplan et al. (2009) find that firms with more alienable assets at the time of business plan have substantially more human capital turnover over time.

Firm characteristics: SIZE is the logarithm of total assets. AGE is the logarithm of company age from incorporation till one year before the buyouts. COMPLEX is a dummy variable, which equals 1 if the target operates at more than one two-digit NACE code industry level and 0 otherwise. We control for these firm characteristics, as they are related to company's

operation and life cycle and thus impact the board turnover.

Industry characteristics: We use the Herfindahl-Hirschman Index (HHI_ASSETS) in terms of total assets at two-digit NACE code industry level each year to proxy for industry concentration ratio. HHI_ASSETS is related to industry-specific knowledge. For instance, in a competitive product market, the industry know-how is transparent and thus facilitates transferable managerial skills. SERVICE_IND is a dummy variable that takes value 1 if the company falls in Fama and French (1997) defined service industries and 0 otherwise. As Vancil (1987) suggested, service industry is relationship based and thus require firm-specific human capital. Therefore, board members with accumulated industry know-how are less likely to be replaced.

The aforementioned control variables are lagged one year.

Industry and year fixed effects: We control for industry-wide and economy shocks that vary over time.

[Insert Table 1 about here]

2.4. Descriptive statistics

Table 2 reports the summary statistics all variables for the full sample of 222 observations, which is split into two groups- PE sponsored buyouts and Bank backed buyouts.

Regarding board turnover, we find that the average share of outgoing board members is 56% for PE sponsored private buyouts compared with 52% for bank backed ones during the post-transaction year. Despite that the PE firms are more active in replacing managers, the difference is not significant. The board turnover rate of PE sponsored buyouts is higher than that in VC backed transactions, where 29% of directors leave the company at the time of IPO (Kaplan et al., 2009). Following the post-transaction year, the average replacement rate of board members in PE sponsored targets remains significantly higher than that in bank financed targets. However, even in PE sponsored targets, the turnover frequency drops dramatically to 17% (for two years after buyouts) and 10% (for three years after buyouts) compared with that in post-transaction year (56%). To evaluate the absolute change, the average board size is 5 for PE sponsored buyouts. Hence, 0.85(0.5) board member will resign

from the company two (three) years after buyouts. Altogether, PE firms are active in dismissing board members after private buyouts. The turnover of outgoing board members concentrates in post-transaction year for both types of private buyouts.

We next look at the average share of incoming board members. 83% of board members are new incomers in PE sponsored buyouts in comparison with 46% in bank backed ones during the post-transaction year. The difference is significant. After post-transaction, PE firms keep recruiting new board members, as evidenced by around 14% of incoming board members, or about 0.7 new board member in an absolute measure. On the contrary, bank backed buyouts seldom recruit new board members after the post-transaction year. Hence, PE firms are also more active in hiring new board members.

There are different changes in board size between two types of private buyouts. For bank financed LBOs, there is a decline in board size from pre-buyouts to post-buyouts. However, the reverse pattern is observed in PE sponsored buyouts. When we look in detail, before private buyouts, the board size of both groups is similar. After buyouts, the board size of PE sponsored targets is larger than that of bank backed ones by roughly one more board member. This may imply that in addition to perform the monitoring role, PE sponsors are assumed to provide support function. Coles et al. (2008) document that companies demanding for advice will benefit from a large board of directors.

We turn to describe the hiring of an outside CEO. There is a relatively higher incidence of an outside CEO appointment (40%) in PE financed private buyouts than that (19%) in bank backed transactions. The difference is significant. The probability of hiring an external CEO in PE sponsored private buyouts is 22% lower than the finding in VC financed businesses (Hellmann and Puri, 2002). But it is higher than a 37.2% of CEO turnover within one year of PE sponsored public-to-private buyouts (Guo et al., 2011). CEO turnover measure captures both internal and external CEO turnover in Guo et al.'s (2011) paper. So the actual outside CEO hiring will be less than 37.2%. Put together, the frequency of an external CEO hiring in mid-market buyouts falls in between VC financed transactions and matured PE sponsored public-to-private buyouts. This piece of evidence probably reflects that, from a company life cycle perspective, private buyouts is another form of transactions occurring after the high growing stage of a company, but before the maturity stage. Moreover, the majority of an external CEO hiring revolves around post-transaction year, only 2 companies out of 222

observations change CEOs after post-transaction year, corresponding to 0.9% of total sample. This is consistent with Cornelli and Karakas' (2013) finding on public-to-private transactions- the CEO turnover is reduced after the post-transaction year.

For pre-buyout board and CEO characteristics, bank financed buyouts have a large fraction of old board members and has a higher probability to have an old CEO whose age is above 65 relative to PE sponsored ones. Considering company characteristics, PE sponsored buyouts have a higher growth rate, more profitable, less tangible assets, larger but younger. This implies that those are growing companies. In contrast with public-to-private buyouts which is mainly poorly performing companies, mid-market companies have a favorable profile with growing needs. We also find that PE sponsored private buyouts are more likely to be in a concentrated industry and service industry.

[Insert Table 2 about here]

2.5. Correlation matrix

Table 3 shows the correlation coefficients among our key independent and control variables. All correlation coefficients are less than 0.6. Multicollinearity is not a serious problem in our sample.

[Insert Table 3 about here]

3. Regressions

3.1. Board turnover

Since mid-market buyout targets develop from start-ups to mature companies, the formation of a professional management team is crucial. While traditional financial investors concern mostly with the financial aspects of the company, PE investors are closely involved investors which suggest that they may go far beyond capital injection function and take a valuable role in human resource management of the buyout companies. PE firms are more likely to replace underperforming managers. At the same time, PE firms intend to attract more talented managers, which is similar to Hellmann and Puri's (2002) finding on VC. Bloom et al. (2007)'s pan European Survey confirmed that PE sponsored companies are well managed, partially due to their human capital to effectively hire and fire managers. To investigate the influence of PE firms on board turnover, we look at the association between PE firms'

involvement and the share of outgoing and incoming board members during the post-transaction year.

We use the following OLS regressions to examine two sets of board changes.

Model 3.1.a. OLS on share of outgoing board members

$$SHARE\_OUTGOING_{i,t} = F(\alpha_1 + \alpha_2 DUM\_PE_{i,t-1} + \alpha_2 OLD\_BOARD_{i,t-1} + \alpha_3 SALESGROW_{i,t-1} + \alpha_4 ROA_{i,t-1} + \alpha_5 \mathrm{PERCTAN}_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 AGE_{i,t-1} + \alpha_8 COMPLEX_{i,t-1} + \alpha_9 \mathrm{HHI}_{i,t-1} + \alpha_{10} SERVICE\_IND_{i,t-1} + YEARFE + INDUSTRYFE)$$

Model 3.1.b. OLS on share of incoming board members

$$SHARE\_INCOMING_{i,t} = F(\alpha_1 + \alpha_2 DUM\_PE_{i,t-1} + \alpha_2 OLD\_BOARD_{i,t-1} + \alpha_3 SALESGROW_{i,t-1} + \alpha_4 ROA_{i,t-1} + \alpha_5 \mathrm{PERCTAN}_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 AGE_{i,t-1} + \alpha_8 COMPLEX_{i,t-1} + \alpha_9 \mathrm{HHI}_{i,t-1} + \alpha_{10} SERVICE\_IND_{i,t-1} + YEARFE + INDUSTRYFE)$$

The dependent variables are share of outgoing board members ($SHARE\_OUTGOING_{i,t}$) and incoming board members ($SHARE\_INCOMING_{i,t}$) respectively.

Table 4 presents the results of regressions of (1) share of outgoing board members and (2) share of incoming board members in the post-transaction year. Column (i) and (iv) serve as base models. We then add our key independent variable PE sponsorship to the base model. Results are shown in column (ii) and (v). We further use PE ownership as a proxy for active PE sponsorship to explore the variation within PE sponsorship. We present the evidence in column (iii) and (vi).

Starting from the base model, the result in column (i) suggests that the fraction of the number of old board members is marginally positively related to the share of outgoing board members. It is a normal departure, because those directors are approaching their retirements (Li and Srinivasan, 2011). On the contrary, we find that the fraction of the number of old board members is unrelated to the share of new incoming board members. Combined with the insignificance of the DIVEST (whether the target company is a family company or the largest shareholder is above 65) reported in paper 2, one interpretation may be that PEs do not in general target the divestment companies and passively replace the old board members.

Instead, they may be active in restructuring boards based on board members' human capital. This also implies that our story is not a pure selection story. Moreover, we show that both industry concentration ratio (HHI_ASSETS) and an indicator of service industry (SERVICE_IND) have a negative association with the percentage of incoming board members. As Vancil (1987) suggested, service industry is relationship based and thus require accumulated firm-specific human capital. Therefore, the supply of board members is smaller in service oriented industries and thus decreases the hiring of new board members. In concentrated markets, there are few companies so that the supply of potential talent (board member) is limited. In addition, the companies are large and complex and the market is not transparent, the outsiders may have limited knowledge of the company. Hence, board members' human capital is less transferable compared to those in competitive industries. In terms of economic significance, for instance, one standard deviation increase in concentration ratio produces a decline of 9.3% (=-1.236* 0.075*100%) of incoming board members. Given that the sample average of incoming board members share is 66.2%, the effect is equivalent to a 14% relative decrease.

Next, we explore the effect of PE firms on changes on the board by including a dummy variable PE to the base model. The finding supports our conjecture that relative to banks, PE firms are more active in replacing board members and meanwhile introducing new board members. The influence of PE firms is more evident in the latter role. It indicates that PE investors make use of their business and professional contacts to recruit personnel. The presence of PE increases 10.1% of the share of outgoing board members. However, PE involvement increases 36.3% of the share of hiring board members. These findings show that in private buyouts, PE firms perform both governance roles as indicated in public to private transactions (Cornelli and Karakas, 2013) and recruitment role as evidenced in VC (Hellmann and Puri, 2002). Other influential factors in the base model remain significant with similar magnitude. Therefore, it eases our concerns that PE may select targets with certain board characteristics and thus affecting board changes. As Beckman and Burton (2008) argued, the evolution of top management teams does not predict VC financing. In the private buyout context, it may imply that PE firms impact buyout target after transactions rather than cherry-picking certain targets.

Further on, instead of treating PE sponsors identically using a PE dummy variable, we explore the variation within PE sponsorship by looking at the equity stake held by PE investors[5]. The equity holding incentivizes PE investors to actively engage in buyout targets. In column (iii) and (vi), similar pattern emerges. For both the share of outgoing and incoming board members, the coefficient on PE ownership is positive and significant. This is consistent with the evidence provided by Cotter and Peck (2001) that when the buyout specialists invest a large stake in the target company, they actively monitor managers on the board. The impact of hiring board members is larger than the influence of replacing board members. One standard deviation increase in PE ownership increases by 4.4% (=0.192* 0.23*100%) of outgoing board members but 12.1% (=0.525* 0.230*100%) of incoming board members separately.

[Insert Table 4 about here]

Overall, our results suggest that PE firms are active in the development of professional team in private buyouts. We find that compared with banks, PE sponsorship increases board turnover, in terms of both departing and hiring board members during the post-transaction year. Moreover, the more equity invested in private buyouts, the more active PE firm is on board turnover. Additionally, a PE firm is more active in hiring new board members rather than replacing incumbent board members.

3.2. Board size

To evaluate the impact of PE firms in boardroom after board turnover, we look at the change in board size. Yermack (1996) shows that small boards are associated with high firm value. In the context of public-to-private buyouts, Cornelli and Karakas' (2013) provide evidence that board size declines drastically after transactions, which is in line with the perception of better boards as corporate governance literature suggested. However, Coles et al. (2008) contend that there are no one-size-fits-all criteria. If the company needs advice from boards, a good board tends to be large. Since PE sponsored private buyouts are described as "growth LBOs", we therefore expect advice is appreciated to foster private targets' further growth. Therefore, PE sponsorship is predicted to increase board size. On the contrary, banks may prefer small board to facilitate monitoring. In the summary statistics, we notice that while the

[5] We also looked at the combination of board seats held by PE and PE ownership, the results confirm that PE ownership is the key influential factor.

bank backed companies experience the decline in board size, the PE sponsored LBOs increases the board size.

We use fixed effects regression to examine the changes on board size during private buyouts (from two years before buyouts and three years after buyouts).

Model 3.2. Fixed-effect regression on board size

$$BOD\_SIZE_{i,t} = \alpha_1 + \alpha_2 POST_{i,t} + \alpha_3 DUM\_PE_{i,t} * POST_{i,t} + YEARFE + COMPANYFE$$

In model 3.2, the dependent variable is board size. We also replace DUM_PE with PE_OWNERSHIP to explore the variation within PE firms.

In table 5, we document that after buyouts, there is a reduction in board size. However, PE sponsored buyouts increase the board size. This finding is in support of our previous results. That is, when PE firms are active in both firing and hiring board members, they are hiring more rather than replacing. Therefore, it results in the increase in overall board size. The finding is opposed to that in public-to-private buyouts, where monitoring role of PE is emphasized to address agency problems in the buyout targets. However, our finding is consistent with the vision for PE sponsored mid-market buyouts, as private buyouts with an aim for expansion. Advice is needed for growth plans and thus the board size is enlarged (Coles et al., 2008, Linck et al., 2008).

[Insert Table 5 about here]

3.3 .Hiring of an outside CEO

In the previous subsection, we observe that PE firms play a significant role in building-up professional team, by dismissing board members, introducing new board members during and increasing board members during the post-transaction year. The natural extension is to investigate whether PE firms also actively influence the leadership of the buyout targets. CEO plays an important role in defining and implementing policies of the company. Bertrand and Schoar (2003) show that there is a CEO fixed effect on company performance. In private buyouts, especially PE sponsored buyouts, targets undergo extensive restructuring and strategic changes (Karen H. Wruck, 2008, Wright et al., 2001). Therefore, the CEO leadership is of particular importance for post-LBO performance. Guo et al. (2011) show that CEO turnover is higher in post-LBO companies than it is in other companies. In our paper,

we focus instead on what determines that an outsider will be selected as CEO after buyouts, as we find no difference in CEO turnover between bank and PE backed private buyouts.

We discuss the choice of CEOs. In order to promote growth and achieve high return, it is possible that PE firms, as active investors, will use their expertise and network to choose a CEO capable of achieving those goals, regardless whether the CEO is an insider or an outsider. In contrast, banks care more about the financial aspect of the targets. They are more likely to rely on inside candidates and spend fewer efforts on external CEO searching and evaluation. As Hellmann and Puri (2002) suggested, bringing in an outside CEO is regarded as a significant step in the professionalization of the management team. The existing literature shows that outside CEOs outperform inside CEOs. Kaplan et al. (2012) document that among 30 aspects of CEO characteristics, outsider CEOs score higher than inside CEOs in 19 aspects. Borokhovich et al. (1996) report significant and favorable abnormal returns following the announcements of an outside CEO appointment. Helmich (1974) finds that the rate of company growth speeds up after CEO succession. The growth is faster when an outside CEO is appointed. Further on, as active investors, PE firms will tend to restructure the company and implement growth plans. Nominated outside CEOs are more inclined to support the policy changes, while the inside CEO are more reluctant to alter large policies which they have helped develop (Helmich, 1974). Taken together, we therefore expect that active PE firms are more likely to introduce an outside CEO.

We use the following logit regression to examine the likelihood of an outside CEO selection during the post-transaction year.

Model 3.3. Logit on the hiring of an outside CEO

$$Logit(OUTSIDE\_CEO_{i,t}) = F(\alpha_1 + \alpha_2 DUM\_PE_{i,t-1} + \alpha_{21} OLD\_CEO_{i,t-1} + \alpha_{22} CEO\_OWNERSHIP_{i,t-1}$$
$$\alpha_3 SALESGROW_{i,t-1} + \alpha_4 ROA_{i,t-1} + \alpha_5 \mathrm{PERCTAN}_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 AGE_{i,t-1} + \alpha_8 COMPLEX_{i,t-1}$$
$$+ \alpha_9 \mathrm{HHI}_{i,t-1} + \alpha_{10} SERVICE\_IND_{i,t-1} + YEARFE + INDUSTRYFE)$$

The dependent variable is a dummy variable, which equals value 1 when the private buyout company replaces the CEO with an outside CEO and 0 if the CEO is selected inside. We verify the turnover event does not precede the PE investments.

We document the results of logit regressions of the hiring of an outside CEO in the post-transaction year in Table 6. Column (i) serves as a base model. We then add our key

independent variable PE sponsorship to the base model. Result is shown in column (iii). We further use PE ownership as a proxy for active PE sponsorship to explore the variation within PE sponsorship. We present the evidence in column (iv). Column (ii), (iv), (vi) report the marginal effects of variables in corresponding models.

From the column (i) of the base model, we notice that CEO ownership is positively related to the likelihood of an outside CEO appointment. One standard deviation increase in CEO ownership increases 11.4% (=0.302* 0.378*100%) of an outside CEO appointment. At the first glance, it might be counterintuitive, as CEO ownership is a proxy for CEO entrenchment power. However, Hellmann and Puri (2002) show that in the subsample of companies where founder is not inclined to relinquish management role, VC manage to appoint an outsider into the position of CEO. As Gong and Wu (2011) argued, in PE sponsored LBOs, entrenched CEOs are considered to prevent boards from incorporating new information and making strategic changes. Thus, PE firms prefer to remove those CEOs and hire new ones who can facilitate changes, most likely to choose external CEOs. We therefore expect a positive relationship between CEO ownership and the probability of hiring of outside CEOs. Mobbs and Racheja (2012) report that a large CEO ownership is associated with a greater likelihood of an external CEO hiring. We also find the industry characteristics, such as industry concentration and service industry indicator, has a negative effect on hiring of an outside CEO. The explanation is similar to the one we elaborated on board members' recruitment. The supply of CEOs in those industries is limited so that there is a low chance of an outside CEO hiring.

We examine whether PE firms are more likely to bring in an outside CEO by including a PE dummy variable in the base model. We find the presence of PE investors increases the propensity toward hiring an external CEO. If the buyout is sponsored by PE rather than a bank, it has 29.3% higher probability to recruit outside CEOs. This is in line with the findings in VC literature, Hellmann and Puri (2002) show that the advent of a VC significantly increase the chances that firms will work with an outside CEO. Complementary with the evidence on the role of PE firms in recruiting new board members, PE firms are active in selecting top manager as well in private buyouts. The influential factors in base model remain significant with similar magnitude.

In column (v) of Table 6, we explore the variation within PE sponsorship by looking at PE investors' ownership in private buyout companies. The rationale is that the larger equity holding of PE investors is, the more active they control the company and the boards. They thus tend to be closely involved in appointing capable CEOs to undertake significant restructuring and strategic changes. We find a positive association between PE ownership and the likelihood of the hiring of an outside CEO that is significant at 1%. The magnitude is economically significant. One standard deviation increase in PE ownership increases the external CEO appointments by 11.5% (=0.498* 0.230*100%). In unreported regression when we include the interaction term of PE ownership and industry concentration ratio, we do not find any specific pattern.

[Insert Table 6 about here]

In summary, our results confirm the importance role of PE firms in initiating leadership changes in private buyouts. We find that in comparison with banks, PE sponsors are more likely to hire an external CEO during the post-transaction year. Moreover, the more equity invested in private buyouts, the more active PE is selecting an outside CEO. These findings can be interpreted as the suggestive evidence that outside CEOs may demonstrate professional managerial skills and are more likely to work with PE firms to implement policy changes in the post-buyout targets. Put together with the previous two pieces of evidence on the board, the whole picture of PE firms emerges: PE firms appoint outside CEOs to professionalize the buyout targets; they are active in both firing and hiring board members to support CEOs to spur the growth of the company. They finally increase board size as advice for growth is needed rather than monitoring for the private buyout companies.

3.4. Additional analyses and robustness tests

3.4.1 Redefine board member turnover

As our first check, we redefine the share of outgoing board members and the share of incoming board members. The board members exclude the CEO post. The purpose is to rule out the natural mechanism that the board turnover is driven by CEO (a key board member) turnover during the post-transaction year. In so doing, we focus on turnover of other board members. We rerun table 4. As revealed in table 7, the findings are relatively similar. We confirm that relative to banks, PE investors are active in both firing and hiring senior managers. The coefficients decline slightly but remain economically significant. For instance,

PE sponsorship increase 34.6% of hiring new board members compared with banks during the post-transaction year (the magnitude is 36.3% in the table 4). Moreover, the fraction of equity holding of PE is positively associated with board turnover. In addition, asymmetric pattern is observed. While both firing and hiring activities are significant, PE firms are much more active in hiring new board members.

[Insert Table 7 about here]

3.4.2 Control for CEO turnover on board member turnover

So far we have shown that PE firms are active in both board member turnover and CEO turnover. In other words, PE firms are inducing leadership changes at the top management as well as building up the professional team. As our second check, we address the question whether there is strong interaction between the turnover of CEO and the turnover of other board members. In table 8, we include a dummy variable of an external CEO hiring in the regression and rerun table 4 with a dependent variable of other board members turnover for the post-transaction period.

Column (i) and column (iv) of table 8 show that an outside CEO appointment is positively related to both hiring and firing board members. This is consistent with the conjecture that outside CEO appointments tend to be followed by more board turnover among senior managers (Helmich and Brown, 1972). In column (iii) and (vi) of Table 8, we include an interaction term between an outside CEO hiring with PE ownership. First, we find there is a significantly positive association between PE ownership and other board member turnover, in terms of recruiting other new board members. Second, we note that an outside CEO appointment still plays a positive role in recruiting other new board members. Third, for the interaction term, given the PE ownership, the hiring of an outside CEO has a negative effect on hiring other new board members. This finding indicates that PE investors may not have the time to initiative changes in both the top and further down in the organization. Another explanation is in order to introduce changes in other board members, PE firms need to work with the incumbent CEO. Summing up coefficients, the PE ownership has an overall positive effect on hiring new board members. In terms of economic significance, one standard deviation on PE ownership increases 3.5% (0.496*0.230-0.344*0.230) of introducing new board members. This finding is further supported by analyzing the board size in the next section.

[Insert Table 8 about here]

3.4.3 Board member turnover after post-transaction year

Till now, we have focused on both CEO turnover and board member turnover during the post-transaction year. As literature shown, post-transaction year is associated with a major change on board initiated by PE firms (Cornelli and Karakas, 2013). Guo et al. (2011) document that PE firms conduct an active selection of the management team for portfolio companies at the time of the buyout or within the first year. As a third check, we extend the time horizon by investigating PEs activities two years after buyouts (after the post-transaction year).

For CEO turnover, we notice that out of 222 observations, only 2 companies change CEOs after post-transaction year, corresponding to 0.9% of total sample. This is consistent with Cornelli and Karakas' (2013) finding on public-to-private transactions- the CEO turnover is reduced after post-transaction year. One explanation is that PE firms attempt to select the best candidate during the post-transaction year and then work with them afterwards. Kaplan et al. (2012) report that PE investors assess CEOs both internally and externally via consulting companies when considering potential investments. After appointments, a CEO plays a large role in building up all aspects of the company and requires certain stability. In so doing, CEOs are given a long horizon to plan a company growth (Parrino, 1997).

For board turnover, there are mixed findings in this regard. Some literature argues that excessive intervention on board can be actually value destroying (Cremer, 1995, Burkart et al., 1997). It implies after a large change, board stability is required to build up a professional team. Other literature disagrees, pointing out an active board turnover shows how closely monitoring/advising is provided by PE investors. Hence, high board turnover ensures a well-functioned board. This is consistent with evidence provided by Cornelli and Karakas (2013) that the board turnover becomes higher after post-transaction. Therefore, it is an empirical matter to show how active PE firms are on board across times.

Table 9 presents the results of regressions of (1) share of outgoing board members and (2) share of incoming board members two years after private buyouts. The approach is similar to that of the post-transaction year. We additionally include lagged turnover ratio to control for reverting pattern.

We look at the impact of PE involvement. Relative to banks, PE investors are continuously more active in firing board members but insignificant in hiring managers as shown in column (ii) and column (v) of table 9. We also find ROA is negatively related to the share of outgoing board members. It is in line with the literature that board members in poorly performing companies are more likely to be replaced (Lech and Zhao, 2006). For the share of incoming board members, the service industry is highly negatively related to the share of incoming board members.

We further explore the variation within PE sponsors to address the question – whether PE investors are still active in board turnover after the post-transaction year. As shown in column (iii) and column (vi), the relationship between PE ownership and share of outgoing (incoming) board members is positive. In terms of economic significance, one standard deviation increase in PE ownership increases by 3.5% (=0.150* 0.230*100%) of outgoing board members and 3.6% (=0.155* 0.230*100%) of incoming board members separately. We then agree with the view of Cornelli and Karakas (2013), after the post-transaction year, PE investors are still active in board turnover, in both firing and hiring managers. The high turnover rate of outgoing managers is in line with the monitoring role of PE on board. Acharya et al. (2013) show that PE firms promptly replace the poorly performing management. The high turnover rate of hiring managers is consistent with the advising role of PE on board. They recruit more board members to support the CEO and carry business forward.

[Insert Table 9 about here]

In summary, our results show that relative to banks, the ownership of a PE firm is positively associated with board turnover, in terms of both departing and hiring board members two years after private buyouts. In addition, both hiring new board members and displacing board members are equally important.

3.4.4 Include other control variables

As our last robust check, we include other firm characteristics, such as leverage and free cash flow. Leverage ratio and free cash flow are proxies for agency problems. It is expected that companies with high agency problems are more likely to initiate changes in both board turnover and CEO turnover. We obtain the similar results in unreported tables. We also direct

test agency problems by generating a dummy variable which equals 1 if there is a separation between CEO and the largest shareholder and 0 otherwise. The result reassures us that the agency problem is a not a big concern in private buyouts and thus has no significant effect on board activities.

Taken together, we find consistent results that compared with banks, PE sponsored buyout companies experience both a high probability of an external CEO appointment and a large board turnover in terms of both hiring and firing board members during the post-transaction year. This indicates that PE firms make leadership change in the post-transaction year and work with CEO afterwards in private buyouts. However, PE firms are still active in dismissing board members and hiring new ones in both post-transaction year and post-post-transaction year. This implies that PE firms are active in building up the management team and supporting the CEOs in private buyouts.

4. Conclusions

In this paper, we investigate the human capital of PE firms on professional board building and CEO appointment in private buyouts, which is in addition to the role of traditional financial intermediaries. We find that PE firms are active in hiring both board members and an outside CEO. This leads to an increase in overall board size.

Our paper sheds some light on the private buyouts. The private buyouts are economically important, in terms of deal volume and combined deal value. According to Strömberg's (2008) global PE survey, there are 10018 worldwide independent private to private buyouts undertaken from 1970 to 2007, which account for 46.8% of overall LBOs. The combined deal value of private buyouts reaches $850 billion, which represents 21.8 of total deal value. Despite the importance of private buyouts, there is little literature in this field. We provide evidence on how PE firms contribute to the professionalization of private targets. Moreover, the literature on board activities focuses on public companies. Our findings show that PE firms play a very important role also when companies are private.

The essential insight that PE firms contribute more than money and monitoring suggests some follow-up research. First, we could explore the characteristics of CEOs PE firms appoint. While Acharya et al. (2013) document that PE partner's background affects the

choice of growth strategies in LBOs, we can complement it by showing whether different CEO background also matters for the performance of private buyouts. Second, we can analyze the change induced in other senior board members. For instance, we currently find that a new CFO (or financial director) is frequently hired after private buyouts. We could further examine which is the expertise and experience of all the new board members and whether their profile is different from hired board members in bank backed deals. In so doing, we would have an in-depth understanding of the influence of PE firms in team-building.

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Table 1: Variables definition

This Table defines the variables we use in the regressions.

Variables	Definition
AGE	It is the logarithm of company age from incorporation till one year before the buyouts.
BOARD_SIZE	It is the number of board members.
CEO_AGE	The age of CEO in one-year before the buyouts measured from the birth date.
CEO_OWNERSHIP	It is the fraction of equity stake held by a CEO.
COMPLEX	A dummy variable, which equals 1 if the target operates at more than one two-digit NACE code industry level and 0 otherwise.
DUM_PE	PE is a dummy variable that equals 1 if private buyouts are sponsored by PE investors and 0 if they are backed by banks.
HHI_ASSETS	Herfindahl-Hirschman Index (HHI) in terms of total assets at two-digit NACE code industry level each year.
OLD_BOARD	It is the ratio of the number of board members whose age is above 65 to the board size.
OLD_CEO	A dummy variable which takes 1 if CEO age is above 65 and 0 otherwise.
OUTSIDE_CEO	A dummy variable which takes value 1 if a private buyout company hired an outside CEO after buyouts and 0 otherwise.
PE_OWNERSHIP	It is calculated as the percentage of equity held by PE investors.
ROA	It is calculated as net income divided by total assets.
SALEGROWTH	Sales growth rate.
SERVICE_IND	A dummy variable that takes value 1 if the company falls in Fama and French (1997) defined service industries and 0 otherwise.
SHARE_OUTGOING	It is calculated as the number of board members departing (incoming) on a board over two consecutive years, divided by average board size in these two years.
SHARE_INCOMING	It is calculated as the number of board members incoming on a board over two consecutive years, divided by average board size in these two years.
SIZE	It is the logarithm of total assets.
TANGIBILITY	It is measured as the ratio of tangible assets to total assets.

Table 2: Descriptive statistics

The table provides descriptive statistics of variables used in the table. Variables are defined in table 1. Post1 (2/3) indicates it is one year (two/three years) after the private buyout. Pre1 indicates it is one year before the private buyout. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Bank backed buyouts (N=102)						Private equity backed buyouts (N=120)							
Variable	N	Mean	St.Dev.	25th	50th	75th	N	Mean	St. Dev.	25th	50th	75th	Diff	
SHARE_OUTGOINGpost1	102	0.52	0.33	0.24	0.50	0.75	120	0.56	0.34	0.31	0.52	0.75	-0.04	
SHARE_OUTGOINGpost2	92	0.05	0.14	0.00	0.00	0.00	96	0.17	0.24	0.00	0.00	0.29	-0.11	***
SHARE_OUTGOINGpost3	83	0.04	0.14	0.00	0.00	0.00	77	0.10	0.20	0.00	0.00	0.13	-0.06	**
SHARE_INCOMINGpost1	102	0.46	0.46	0.00	0.36	0.86	120	0.83	0.41	0.56	0.80	1.11	-0.37	***
SHARE_INCOMINGpost2	92	0.03	0.13	0.00	0.00	0.00	96	0.14	0.22	0.00	0.00	0.22	-0.11	***
SHARE_INCOMINGpost3	83	0.03	0.10	0.00	0.00	0.00	77	0.11	0.21	0.00	0.00	0.18	-0.08	***
OUTSIDE_CEO	102	0.19	0.39	0.00	0.00	0.00	120	0.40	0.49	0.00	0.00	1.00	-0.21	***
BOARD_SIZEpre1	102	4.57	2.09	3	4	6	120	4.41	3.25	3	4	5.5	0.16	
BOARD_SIZEpost1	102	4.19	1.76	3	4	5	120	5.27	1.48	4	5	6	-1.08	***
BOARD_SIZEpost2	92	4.25	1.88	3	4	5	96	5.13	1.66	4	5	6	-0.88	***
BOARD_SIZEpost3	83	4.13	1.80	3	4	5	77	5.19	1.58	4	5	6	-1.06	***
OLD_BOARD	101	0.23	0.26	0.00	0.17	1.00	120	0.17	0.21	0.00	0.00	1.00	0.06	*
CEO_OWNERSHIP	102	0.43	0.38	0.00	0.35	0.85	120	0.44	0.38	0.03	0.41	0.81	-0.01	
OLD_CEO	102	0.25	0.44	0.00	0.00	1.00	120	0.15	0.36	0.00	0.00	0.00	0.1	***
SALESGROWTH	102	0.10	0.16	-0.02	0.06	0.16	120	0.21	0.19	0.07	0.19	0.36	-0.12	***
ROA	102	0.06	0.06	0.02	0.05	0.09	120	0.11	0.08	0.05	0.10	0.17	-0.05	***
TANGIBILITY	102	0.25	0.19	0.10	0.20	0.37	120	0.21	0.18	0.07	0.16	0.31	0.04	*
SIZE	102	20.65	33.97	5.13	8.86	18.28	120	27.63	39.61	8.54	15.99	32.06	-6.97	*
AGE	102	25.75	21.24	11.00	18.00	33.00	120	16.69	14.99	7.00	13.00	21.00	9.06	***
COMPLEX	102	0.23	0.42	0.00	0.00	0.00	120	0.27	0.44	0.00	0.00	1.00	-0.04	
HHI_ASSETS	102	0.08	0.07	0.03	0.06	0.12	120	0.10	0.08	0.05	0.08	0.13	-0.02	**
SERVICE_IND	102	0.15	0.36	0.00	0.00	0.00	120	0.28	0.45	0.00	0.00	1.00	-0.14	***

Table 3: Pearson correlation matrix

The table shows correlation coefficients on key independent and control variables. Variables are defined in table 1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	PE	PE_OWNER-SHIP	OLD_BOD	CEO_OWNER-SHIP	CEO_AGE	SALES-GROWTH	ROA	TANGIBILITY	SIZE	AGE	COMPLEX	HHI_ASSETS	SERVICE_IND
DUM_PE	1												
PE_OWNERSHIP	0.788***	1											
OLD_BOARD	-0.047	-0.049	1										
CEO_OWNERSHIP	0.019	0.078	-0.040	1									
CEO_AGE	-0.131*	-0.127*	0.261***	0.177***	1								
SALESGROWTH	0.319***	0.309***	0.040	0.016	-0.100	1							
ROA	0.330***	0.296***	-0.003	0.044	-0.011	0.294***	1						
TANGIBILITY	-0.110	-0.025	0.026	0.069	0.026	-0.054	-0.165**	1					
SIZE	0.228***	0.217***	0.055	-0.128	-0.089	0.025	-0.118*	0.117*	1				
AGE	-0.268***	-0.179***	0.031	0.118*	0.052	-0.213**	-0.114*	0.147**	0.026	1			
COMPLEX	0.048	0.041	-0.003	0.032	0.029	-0.066	0.041	-0.125*	0.082	0.047	1		
HHI_ASSETS	0.144**	0.107	0.059	-0.153	0.056	0.025	-0.047	0.125*	0.044	-0.004	0.016	1	
SERVICE_IND	0.164**	0.080	0.092	-0.059	0.035	0.377***	0.014	-0.045	-0.054	-0.355***	-0.104	-0.063	1

Table 4: Changes on the board during the post-transaction year (PE firms relative to Banks)

This table reports OLS regression coefficients (robust standard errors in parentheses) for changes on the board during the post-transaction year (one year after private buyouts). The dependent variables are the share of outgoing board members (column 1-3) and share of incoming board members (column 4-6) respectively. Share of outgoing (incoming) board members is defined as the number of board members departing (incoming) on a board over two consecutive years, divided by average board size in these two years. DUM_PE is a dummy variable, which equals 1 if the private buyouts are sponsored by PE firms and 0 if financed by banks. PE_OWNERSHIP is percentage of equity stake held by PE firms. Other variables are defined in Table 1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Percentage of outgoing board members			Percentage of incoming board members		
	Model 1: Base (i)	Model 2: DUM_PE (ii)	Model 3: PE_Ownership (iii)	Model 1: Base (iv)	Model 2: DUM_PE (v)	Model 3: PE_Ownership (vi)
DUM_PE		0.101*			0.363***	
		(0.056)			(0.065)	
PE_OWNERSHIP			0.192**			0.525***
			(0.083)			(0.101)
OLD_BOARD	0.157	0.180*	0.169*	(0.071)	0.011	0.040
	(0.100)	(0.102)	(0.099)	(0.166)	(0.156)	(0.160)
SALEGROWTH	-0.088	-0.131	-0.149	0.141	-0.015	-0.028
	(0.143)	(0.149)	(0.147)	(0.195)	(0.169)	(0.169)
ROA	-0.070	-0.242	-0.241	1.072**	0.457	0.604
	(0.315)	(0.318)	(0.315)	(0.437)	(0.425)	(0.435)
TANGIBLITY	0.174	0.195	0.173	-0.002	0.075	-0.005
	(0.140)	(0.141)	(0.139)	(0.163)	(0.156)	(0.158)
SIZE	0.037	0.024	0.024	-0.001	-0.045	-0.035
	(0.026)	(0.026)	(0.026)	(0.034)	(0.031)	(0.032)
AGE	0.015	0.026	0.023	-0.081*	-0.044	-0.060
	(0.034)	(0.034)	(0.034)	(0.044)	(0.042)	(0.042)
COMPLEX	-0.036	-0.040	-0.043	0.005	-0.009	-0.014
	(0.048)	(0.049)	(0.049)	(0.074)	(0.068)	(0.066)
HHI_ASSETS	-0.176	-0.274	-0.258	-1.236**	-1.586***	-1.459**
	(0.391)	(0.396)	(0.386)	(0.520)	(0.447)	(0.469)
SERVICE IND	0.066	0.088	0.088	-0.286**	-0.204	-0.224*
	(0.099)	(0.095)	(0.095)	(0.137)	(0.131)	(0.130)
INDUSTRY FE	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES
Observations	222	222	222	222	222	222
Adjusted R^2	0.002	0.014	0.022	0.092	0.198	0.182

Table 5: Fixed effect regression on board size

This table reports regression coefficients (standard errors in parentheses) for board size from two years before buyouts to three years after buyouts. The dependent variable is board size. POST is a dummy variable, which equals one if the year is after buyouts and zero otherwise. DUM_PE is a dummy variable, which equals 1 if the private buyouts are sponsored by PE firms and 0 if financed by banks. PE_ACTIVE is a dummy variable, which equals 1 if PE firms sitting on the board both in transition year and after transition year and 0 otherwise. PE_OWNERSHIP is a dummy variable which takes value 1 if the equity holding of PE firms is above 0.1 and 0 otherwise.*, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

PANEL A	PE	PANEL B	PE_OWNERSHIP	PANEL C	PE_ACTIVE
POST*DUM_PE	1.297***	POST*OWNERSHIP	1.519	POST*PEACTIVE	1.559***
	(0.25)		(1.076)		(0.28)
POST	-0.485***	POST	-0.203	POST	-0.433***
	(0.14)		(0.227)		(0.12)
COMPANY FE	Yes	COMPANY FE	Yes	COMPANY FE	Yes
YEAR FE	Yes	YEAR FE	Yes	YEAR FE	Yes
Estimates	FE	Estimates	FE	Estimates	FE
Standard errors	white	Standard errors	white	Standard errors	white
Observations	989	Observations	989	Observations	989
No. of deals	217	No. of deals	217	No. of deals	217
Adjusted R^2	0.372	Adjusted R^2	0.021	Adjusted R^2	0.381

Table 6: Hiring an outside CEO during the post-transaction year (PE firms relative to Banks)

This table reports logit regression coefficients (standard errors in parentheses) for the hiring of outside CEOs during the post-transaction year (one year after private buyouts). The dependent variable is a dummy variable, which takes value 1 if the CEO is selected from outside and 0 if the CEO is chosen from inside. DUM_PE is a dummy variable, which equals 1 if the private buyouts are sponsored by PE firms and 0 if financed by banks. PE_OWNERSHIP is percentage of equity stake held by PE firms. Other variables are defined in Table 1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

AN OUTSIDE_CEO	Model 1: Base (i)	Model 1: Base dy/dx (ii)	Model 2: DUM_PE (iii)	Model 2: DUM_PE dy/dx (iv)	Model 3: PE_Ownership (v)	Model 3: PE Ownershipdy/dx (vi)
DUM_PE			1.684***	0.293***		
			(0.441)	(0.069)		
PE_OWNERSHIP					2.724***	0.498***
					(0.644)	(0.154)
CEO_OWNERSHIP	1.567**	0.302***	1.439**	0.262**	1.389**	0.254**
	(0.477)	(0.090)	(0.502)	(0.088)	(0.497)	(0.089)
OLD_CEO	0.147	0.029	0.419	0.081	0.421	0.082
	(0.437)	(0.088)	(0.447)	(0.091)	(0.434)	(0.089)
SALEGROWTH	1.229	0.237	0.751	0.137	0.223	0.041
	(1.018)	(0.195)	(1.070)	(0.193)	(1.103)	(0.201)
ROA	0.019	0.004	-2.630	-0.478	-2.170	-0.397
	(2.469)	(0.476)	(2.624)	(0.475)	(2.653)	(0.487)
TANGIBLITY	-0.448	-0.086	-0.099	-0.018	-0.446	-0.082
	(1.104)	(0.213)	(1.139)	(0.207)	(1.121)	(0.205)
SIZE	0.005	0.001	-0.226	-0.041	-0.214	-0.039
	(0.179)	(0.035)	(0.190)	(0.035)	(0.194)	(0.036)
AGE	-0.043	-0.008	0.164	0.030	0.061	0.011
	(0.224)	(0.043)	(0.231)	(0.042)	(0.230)	(0.042)
COMPLEX	-0.587	-0.105	-0.743*	-0.122**	-0.764*	-0.126**
	(0.403)	(0.067)	(0.410)	(0.061)	(0.407)	(0.061)
HHI_ASSETS	-5.708*	-1.101*	-8.485**	-1.543**	-7.713**	-1.410**
	(3.074)	(0.588)	(3.187)	(0.564)	(3.154)	(0.574)
SERVICE IND	-2.332**	-0.318***	-2.763**	-0.332***	-2.435**	-0.308***
	(0.916)	(0.089)	(0.996)	(0.080)	(0.981)	(0.085)
INDUSTRY FE	Yes	Yes	Yes	Yes	Yes	Yes
YEAR FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	220	220	220	220	220	220
Pseudo R^2	0.142	0.142	0.198	0.198	0.204	0.204

Table 7: Robustness test 1-Changes on the board during the post-transaction year (PE firms relative to Banks)

This table reports OLS regression coefficients (robust standard errors in parentheses) for changes on board during the post-transaction year (one year after private buyouts). The dependent variables are share of outgoing board members (column 1-3) and share of incoming board members (column 4-6) respectively. The board members exclude CEO post and thus focus on other board members. Percentage of departing (incoming) board members is defined as the number of board members departing (incoming) on a board over two consecutive years, divided by average board size in these two years. DUM_PE is a dummy variable, which equals 1 if the private buyouts are sponsored by PE firms and 0 if financed by banks. PE_OWNERSHIP is percentage of equity stake held by PE firms. Other variables are defined in Table 1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Percentage of outgoing board members			Percent of incoming board members		
	Model 1: Base (i)	Model 2: DUM_PE (ii)	Model 3: PE_Ownership (iii)	Model 1: Base (iv)	Model 2: PE (v)	Model 3: PE Ownership (vi)
DUM_PE		0.086			0.346***	
		(0.053)			(0.059)	
PE_OWNERSHIP			0.173**			0.503***
			(0.084)			(0.093)
OLD_BOARD	0.116	0.134	0.125	(0.107)	(0.033)	(0.081)
	(0.107)	(0.108)	(0.106)	(0.141)	(0.130)	(0.135)
SALEGROWTH	0.022	-0.018	-0.037	0.264	0.103	0.093
	(0.134)	(0.142)	(0.141)	(0.178)	(0.155)	(0.152)
ROA	-0.152	-0.297	-0.305	0.989**	0.404	0.542
	(0.322)	(0.313)	(0.319)	(0.397)	(0.382)	(0.388)
TANGIBLITY	0.133	0.152	0.133	-0.047	0.031	-0.046
	(0.140)	(0.140)	(0.139)	(0.146)	(0.137)	(0.139)
SIZE	0.075**	0.065**	0.064**	0.036	-0.004	0.005
	(0.025)	(0.025)	(0.024)	(0.031)	(0.028)	(0.028)
AGE	0.031	0.039	0.038	-0.065	-0.030	-0.045
	(0.034)	(0.033)	(0.033)	(0.040)	(0.037)	(0.037)
COMPLEX	-0.018	-0.023	-0.026	0.028	0.010	0.006
	(0.046)	(0.048)	(0.048)	(0.068)	(0.062)	(0.060)
HHI_ASSETS	0.118	0.037	0.047	-0.951**	-1.277**	-1.158**
	(0.376)	(0.383)	(0.373)	(0.471)	(0.395)	(0.423)
SERVICE IND	0.057	0.076	0.077	-0.294**	-0.216*	-0.236**
	(0.089)	(0.086)	(0.086)	(0.122)	(0.116)	(0.115)
INDUSTRY FE	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES
Observations	221	221	221	221	221	221
Adjusted R^2	0.026	0.034	0.042	0.117	0.231	0.215

Table 8: Robustness test 2-Changes on the board during the post-transaction year (PE firms relative to Banks)

This table reports regression coefficients (robust standard errors in parentheses) for changes on the board during the post-transaction year (one year after private buyouts). The dependent variables are share of outgoing board members (column 1-3) and share of incoming board members (column 4-6) respectively. The board members exclude CEO post and thus focus on senior managers. DUM_PE is a dummy variable, which equals 1 if the private buyouts are sponsored by PE firms and 0 if financed by banks. PE_OWNERSHIP is percentage of equity stake held by PE firms. Outside_CEO is a dummy variable which equals one if an outside CEO is appointed on board and zero otherwise. Other variables are defined in Table 1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Percentage of outgoing board members			Percentage of incoming board members		
	Model 1: Base (i)	Model 2: DUM_PE (ii)	Model 3: PE_Ownership (iii)	Model 1: Base (iv)	Model 2: DUM_PE (v)	Model 3: PE_Ownership (vi)
OUTSIDE_CEO	0.109**	-0.024	0.092	0.325***	0.365***	0.371***
	(0.053)	(0.077)	(0.079)	(0.057)	(0.104)	(0.087)
DUM_PE		0.017			0.311***	
		(0.060)			(0.068)	
DUM_PE* OUTSIDE_CEO		0.177*			-0.162	
		(0.100)			(0.125)	
PE_OWNERSHIP			0.136			0.496***
			(0.100)			(0.129)
PE_OWNERSHIP* OUTSIDE_CEO			-0.021			-0.344*
			(0.165)			(0.182)
OLD_BOARD	0.110	0.140	0.118	-0.123	-0.077	-0.104
	(0.106)	(0.106)	(0.106)	(0.134)	(0.128)	(0.131)
SALEGROWTH	0.018	-0.009	-0.026	0.252	0.129	0.114
	(0.132)	(0.141)	(0.140)	(0.162)	(0.149)	(0.144)
ROA	-0.159	-0.242	-0.274	0.967**	0.498	0.608
	(0.320)	(0.319)	(0.320)	(0.384)	(0.385)	(0.385)
TANGIBLITY	0.136	0.144	0.136	-0.038	0.025	-0.033
	(0.138)	(0.136)	(0.138)	(0.138)	(0.132)	(0.133)
SIZE	0.076**	0.068**	0.068**	0.039	0.008	0.015
	(0.024)	(0.025)	(0.024)	(0.028)	(0.027)	(0.027)
AGE	0.030	0.038	0.035	-0.068*	-0.042	-0.052
	(0.033)	(0.033)	(0.034)	(0.037)	(0.036)	(0.036)
COMPLEX	-0.010	-0.018	-0.016	0.053	0.037	0.043
	(0.046)	(0.047)	(0.048)	(0.062)	(0.060)	(0.060)
HHI_ASSETS	0.168	0.157	0.102	-0.802*	-1.136**	-1.024**
	(0.362)	(0.381)	(0.372)	(0.477)	(0.423)	(0.445)
SERVICE IND	0.075	0.095	0.085	-0.241**	-0.199*	-0.214**
	(0.087)	(0.088)	(0.086)	(0.112)	(0.108)	(0.106)
INDUSTRY FE	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES
Observations	221	221	221	221	221	221
Adjusted R^2	0.044	0.053	0.045	0.233	0.301	0.290

Table 9: Robustness test 3-Changes on the board during two years after buyouts (PE firms relative to Banks)

This table repors regression coefficients (standard errors in parentheses) for changes on the board during two years after buyouts. The dependent variables are share of outgoing board members (column 1-3) and share of incoming board members (column 4-6) respectively. Share of outgoing (incoming) board members is defined as the number of board members departing (incoming) on a board over two consecutive years, divided by average board size in these two years. DUM_PE is a dummy variable, which equals 1 if the private buyouts are sponsored by PE firms and 0 if financed by banks. PE_OWNERSHIP is percentage of equity stake held by PE firms. Other variables are defined in Table 1. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Percentage of outgoing board members			Percentage of incoming board members		
	Model 1: Base	Model 2: DUM_PE	Model 3: PE_Ownership	Model 1: Base	Model 2: DUM_PE	Model 3: PE_Ownership
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
DUM_PE		0.083**			0.059	
		(0.039)			(0.042)	
PE_OWNERSHIP			0.150**			0.155**
			(0.068)			(0.072)
LAGSHARE_OUTGOING	0.016	-0.003	-0.014			
	(0.056)	(0.056)	(0.058)			
LAGSHARE_INCOMING				0.000	-0.014	-0.025
				(0.030)	(0.031)	(0.031)
OLD_BOARD	-0.007	0.004	0.004	0.008	0.012	0.013
	(0.084)	(0.083)	(0.082)	(0.069)	(0.068)	(0.067)
SALEGROWTH	0.027	0.016	0.009	0.018	0.013	0.006
	(0.031)	(0.030)	(0.030)	(0.028)	(0.027)	(0.027)
ROA	-0.737**	-0.593*	-0.500	-0.528**	-0.434	-0.296
	(0.332)	(0.320)	(0.308)	(0.263)	(0.268)	(0.255)
TANGIBLITY	-0.217*	-0.127	-0.133	-0.150	-0.100	-0.095
	(0.114)	(0.120)	(0.117)	(0.106)	(0.100)	(0.104)
SIZE	0.007	-0.006	-0.007	0.019	0.010	0.005
	(0.017)	(0.019)	(0.018)	(0.016)	(0.019)	(0.019)
AGE	0.013	0.018	0.013	-0.011	-0.008	-0.013
	(0.021)	(0.021)	(0.021)	(0.023)	(0.023)	(0.023)
COMPLEX	-0.007	-0.015	-0.017	0.015	0.010	0.007
	(0.038)	(0.039)	(0.039)	(0.035)	(0.035)	(0.035)
HHI_ASSETS	0.015	-0.073	-0.040	-0.007	-0.087	-0.095
	(0.214)	(0.225)	(0.214)	(0.166)	(0.163)	(0.169)
SERVICE IND	-0.020	-0.001	0.004	-0.087**	-0.078*	-0.073*
	(0.054)	(0.057)	(0.056)	(0.042)	(0.044)	(0.042)
IDUSTRY FE	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES
Observations	173	173	173	173	173	173
Adjusted R^2	0.053	0.070	0.073	0.043	0.050	0.070